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BIRDS OF EL SALVADOR .

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EL SALVADOR BOBWHTES

THE BIRDS OF EL SALVADOR

by

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PREFACE

The present account of the avifauna of El Salvador was initiated in 1912 when, at the suggestion of A. Brazier Howell, I first went to that interesting country (then called Salvador) and made a small collection of birds, the gathering of which it must be confessed was conducted with a large amount of youthful enthusiasm combined with a minimum of judgment. In 1925, I suggested to Donald R. Dickey that this early visit might be made the beginning of a systematic survey of this small, ornithologically unknown country. He promptly adopted my proposal and during most of the years 1925, 1926, and 1927, I was occupied in field work in El Salvador. The expense of these investigations was borne entirely by Mr. Dickey. He made preparations on various occasions to join me, but business or ill health always interfered so that, much to our mutual disappointment, none of these intentions materialized.

It was our definite plan to prepare a report under joint authorship, and most of the descriptions of the new forms discovered have been published on this basis. While the routine systematic work necessarily fell to me as did the initial rough draft of the report, Mr. Dickey intended to write the final copy himself. In 1930, when it became evident that the condition of his health would not permit long sustained work, he asked me to take over the rewriting and to put the manuscript into shape for publication. This task was interrupted by other work and was completed only a short time before Mr. Dickey's sudden death on April 15, 1932.

Although unable to do active work subsequent to 1930, Mr. Dickey made various suggestions regarding the final account, most of which have been followed. Since his death I have gone over the entire paper, and have changed it here and there in order to have it more closely accord with his expressed ideas and wishes. For this as well as for personal reasons, it has seemed fitting that Mr. Dickey be regarded as joint author. That this may serve as a concrete indication of our long and friendly association in ornithological work is my sincere desire. The style is necessarily my own, and any blame for errors of omission and commission must fall entirely upon me.

A. J. VAN ROSSEM

THE BIRDS OF EL SALVADOR

BY

DONALD R. DICKEY AND A. J. VAN ROSSEM

ITINERARY

Although the dates under which collections or observations were made have been included in the gazetteer section of this report, it is desirable to give also the chronological sequence of stations at which collections were made personally. The permanent headquarters of van Rossem and Stirton were, of course, in San Salvador, where the storage facilities for surplus supplies was provided by the government.

Although many observations were recorded at points en route to the capital, and between that place and the many field stations, the dates of such notes are not included here. The localities listed are the more or less permanent field camps (fig. 1). It is not feasible to record all of the frequent one-day excursions within walking distance of these camps, nor to name all places mentioned in the text at which specimens were observed or taken. In most cases the localities thus omitted are points passed en route from one base camp to another.

February 22-March 17, 1912, San Salvador
March 18, 1912, Lake Ilopango
March 19-April 1, 1912, San Salvador
April 12, 1912, Volcán de San Salvador
April 13, 1912, Lake Ilopango
April 14-May 1, 1912, San Salvador
May 13-24, 1912, Lake Channmico
May 29-June 4, 1912, Volcán de San Salvador
June 5-7, 1912, Lake Channmico
June 10-30, 1912, Zapotitán
July 13-31, 1912, San Sebastián
July 27-September 20, 1925, Lake Olomega
September 21-October 4, 1925, Divisadero
October 6-9, 1925, Monte Mayor
October 9, 1925, San Sebastián (in Dept. La Unión)
October 10-23, 1925, Divisadero
October 25-30, 1925, Río Goascorán
November 1-14, 1925, Divisadero
November 16-19, 1925, Ciudad Barrios
November 20-December 23, 1925, Mt. Cacaguatique
December 24-27, 1925, Divisadero
December 30, 1925-January 27, 1926, Puerto del Triunfo
January 31-February 22, 1926, Río San Miguel

February 24–March 8, 1926, Volcán de Conchagua
 March 11–27, 1926, Volcán de San Miguel
 March 28–April 4, 1926, Divisadero
 April 5–15, 1926, Lake Olomega
 January 20–27, 1927, Colima
 January 28–31, 1927, La Palma
 February 1–March 10, 1927, Los Esesmiles
 March 11–18, 1927, San José del Sacare
 March 31–April 19, 1927, Barra de Santiago
 April 20–30, 1927, Chilata
 May 5–21, 1927, Volcán de Santa Ana
 May 22–31, 1927, Lake Guija
 June 4–8, 1927, Miraflores
 June 15–23, 1927, Zapotitán

ACKNOWLEDGMENTS

Should we attempt to mention by name all the numerous hospitable and kindly people who, in one way or another, aided the field work in El Salvador, the list would be embarrassingly long. Among those whom we wish to thank especially for assistance and for personal favors are ex-President Jorge Meléndez, ex-President Alfonso Quiñónez, ex-Vice-President Gustavo Vides, ex-Secretary of Agriculture Marcos Letona, Messrs. Rudolfo Duke, Alejandro Gómez, Emilio González, Harry Humberstone, Max Kohlmeyer, Carlos E. Silva, G. A. Swanquist, and finally Mr. Frederic W. Taylor who, not only in his capacity of Director General of Agriculture, but in numerous other ways devoted an unlimited amount of time and energy to making our work as easy and pleasant as possible.

In the field, Mr. R. A. Stirton, now Curator of Vertebrate Paleontology at the University of California, who accompanied van Rossem on two trips as mammalogist, proved to be one of those rare men who by unfailing energy in the face of many discouragements and keen interest in the ornithological part of the program made not only an ideal companion, but contributed no small number of rarities in the way of birds.

While preparing this report we have asked advice on many problems from Messrs. Outram Bangs, Ludlow Griscom, C. E. Hellmayr, H. C. Oberholser, J. L. Peters, C. W. Richmond, and Alexander Wetmore; to all of these our thanks are due. In addition we are under very great obligation to Drs. Wilfred Osgood and Alexander Wetmore for reading and criticizing the manuscript.

SUMMARY OF ORNITHOLOGICAL WORK

1838.—The earliest record of ornithological work in El Salvador appears to be that by Captain Sir Edward Belcher, R.N., who mapped portions of the Pacific coast of Central America in the years 1837, 1838, and 1839 while in command of the *Sulphur* and the *Starling*. An account of the operations in Salvadorean waters may be found in Volume 1 of Captain Belcher's "Narrative of a Voyage Round the World," London, 1843. Chapters 2, 7, and 10 contain those portions of the log covering the coast between La Libertad, El Salvador and Realejo, Nicaragua. Unfortunately, no specific mention is made of any single species of bird, although the *Sulphur* and the *Starling* both were at anchor either at or near La Unión almost continuously from November 19 to December 30, 1838. It is almost certain that some collecting of specimens was done here, for on pages 243 and 244 the account says, "Deer were noticed and said to abound on Manguera, Conchaguita [Salvador] and Tiger [Honduras] Islands. Rabbits and squirrels with the addition of jackalls may complete the list . . . I . . . killed some wild ducks. Wild turkeys [i.e. curassows] were shot for the table and several handsome varieties of small birds for the collection." The ornithology of the expedition was written up by Gould in the "Zoology of the Voyage of the Sulphur," and later contributions were made in other publications, but no mention is made of any specimens taken in Salvador.

It is of interest to note that Captain Belcher uses two names for the Salvadorean port in the Gulf of Fonseca, for in his first description he refers to it as "La Unión (or San Carlos) the town of the port of Conchagua, properly so called." In the narrative itself he is not so precise, designating it sometimes as La Unión, but usually as San Carlos.

1841. The next visit of record was made in 1841 by Pierre Adolphe Lesson when he was major surgeon of the French war vessel *Le Pylade*. The ship was evidently at San Carlos (La Unión) for some time, for Lesson secured there an interesting collection of birds. About a year later these were described by his brother R. P. Lesson, chiefly in the "Revue Zoologique." Among the species described or noted were *Crypticus apiaster*, *Momotus lessonii*, *Penelope albiventer*, *Pitylus lazulus*, *Ortyx leucopogon*, *Tinamus cinnamomea*, *Coccyzus erythropyga*, *Psaris tityroides*, *Psittacus chrysopogon*, and *Icterus mentalis*.

In connection with these descriptions much needless confusion has arisen regarding the location of "San Carlos," which in Lesson's descriptions was given as in "America centralis Oceani Pacifici" or "République du Centre Amérique" or simply as "Centre Amérique." As a matter of fact and to clear Lesson of any charge of ambiguity in this regard, it may be pointed out that in 1841 Salvador, the sole remnant of the old five-state republic, still regarded herself as a province of the former confederation. La Unión and San Carlos are, of course, synonymous, the latter being the older name. Any reliable history of Central America gives these facts. It is difficult to understand how the specific statement "San Carlos, prov. de San Salvador" which appears on page 130 of the April, 1842, issue of the "Revue Zoologique" could have been so consistently overlooked.

1862 and 1863.—In the early '60's, Captain Dow, master of the coastal steamer *Guatemala*, collected a few birds at various ports of call, among them Acajutla and La Unión. Perhaps the most interesting record made by him was that of *Thalasseus elegans*, a specimen of which he secured at La Unión on December 18, 1862, and which remains the only record of the species for the country. In March, 1863, Osbert Salvin was a passenger on the *Guatemala* and collected and observed some birds at La Unión while the ship was at that place. It is known that he climbed the volcano of Conchagua, that he noticed such species as *Thryophilus pleurostictus* and *Salpinctes obsoletus*, and that at La Unión he took several specimens of *Polioptila*.

1891.—During the early part of 1891, W. B. Richardson collected from "February to April" at La Libertad and on Volcán de San Miguel in the interests of Salvin and Godman, who were at that time engaged in writing their monumental contribution to the "Biologia Centrali-Americana." Specimens which Richardson collected were, in part, recorded in the issues of the Biologia published subsequent to his visit, and others in various places later. The most interesting takes on Volcán de San Miguel were examples of *Aratinga rubritorquis*, which remain unique so far as El Salvador is concerned, and the type of *Salpinctes guttatus*.

1912-27.—At the suggestion and with the help of A. Brazier Howell, van Rossem first collected in El Salvador from February 22 to August 20, 1912. During this time 895 birds were obtained, most of which are now a part of the Dickey collection at the California Institute of Technology. Unfortunately, almost a third of these were dispersed in various directions years before the present work

was contemplated. In 1925 van Rossem again returned to El Salvador, this time in the interests of the Dickey collection, and in the interval between July, 1925, and April 29, 1926, collected 2,633 specimens besides a number of nests and eggs. On this trip he was accompanied by R. A. Stirton who, though concerned chiefly with mammals, was of great assistance in the procuring of some of the rarer birds. In 1925 also, Loye H. and Alden Miller took collectively some 500 skins between July 1 and August 22. All of those taken by Alden Miller, 303 in number, are now in the Dickey collection. Finally, in 1927, van Rossem made a third trip, and in company with R. A. and George Stirton (the two latter as before primarily collecting mammals), worked the northern and western departments. On this last trip field work was carried on from January 14 to July 11, with a resulting collection of 1,273 skins. For exact dates when work was done in specific localities, see Gazetteer.

Miscellaneous.—A few skins have from time to time been picked up by persons not actively interested in ornithology and have found their way into institutions or large private collections. Where such have been located, notice of the fact is made under the heading of the species concerned. It is certain that a resident German named Carlos Kreitz sent a number of skins to Germany in the '80's, but so far as known, nothing has been published on them. It is likely that most of them were absorbed by the millinery trade but, even if any remain in European collections at the present day, they are not to be relied on for locality. A few years before Kreitz's death he told van Rossem (in 1912) that he had also collected more or less extensively in Honduras and Nicaragua. None of his specimens were labeled, so far as he could remember.

GAZETTEER

Acajutla. 13°37' N., 89°50' W.—The most westerly of the three principal seaports and terminus of a narrow gauge railroad to San Salvador. Acajutla is essentially an open roadstead, and in even moderately rough weather steamers have great difficulty in landing cargo or passengers. The town has a population of a few hundred supported almost entirely by cargo working. The narrow coastal plain extends northwest unbroken to the Guatemalan border, but low hills, the westernmost outposts of the Balsam Range, reach to the sea just east of the town. In these low hills, covered with grass and scrub, Gould's type of *Ortyx hypoleucus* must have been collected, for the swampy area to the north and west is utterly unsuited to the

species. Captain Dow obtained at Acajutla the only known Salvadorean record of *Phaëthon aethereus*. No collecting was done here by van Rossem, although a few species were noted on several occasions when the place was visited.

Balsam Range.—See Acajutla and Chilata.

Barra de Santiago. $13^{\circ}47' N.$, $90^{\circ}03' W.$ —A small fishing village on the coast near the Guatemalan border and near the tip of a sandy peninsula bounding a tidal lagoon. This lagoon is several square miles in area and cut up into innumerable mangrove islands and channels (pl. V). The country immediately behind the mangroves is low and swampy and covered largely with uncut forest (pl. XII), typical of most parts of the coastal plain. The vegetation of the peninsula itself consists mostly of thorny scrub (pl. VI), although about the village some groves of cocoanut palms have been planted. During the two weeks spent here from March 31 to April 19, 1927, the northbound shorebird migration was at its height, and about equal proportions of time were employed about the tide flats and beach, the mangrove channels, and the swampy forest (pl. XVI). Barra de Santiago is most easily accessible by following the beach from Acajutla at low tide.

Cerro del Águila. $13^{\circ}55' N.$, $89^{\circ}42' W.$ —The northernmost of the small, long-extinct cones clustered on the flanks of Volcán de Santa Ana. It bears a heavy cloud forest from its base at about 4,500 feet to its summit at 6,000 feet, and is, of course, in the Humid Upper Tropical Zone. Only one day's collecting was done here on May 19, 1927, since this cone differed in no respect from the more readily accessible Cerro de Los Naranjos.

Cerro de Los Naranjos. $13^{\circ}53' N.$, $89^{\circ}42' W.$ —A small, extinct cone on the northwest flank of Volcán de Santa Ana, its base being at about 4,500 feet and its summit at 6,000 feet. It is entirely within the Humid Upper Tropical Zone and is heavily timbered with a cloud forest of oaks and other hardwoods. Collecting was carried on in this vicinity, either on Cerro de Los Naranjos or on Volcán de Santa Ana, during the period between May 5 and May 21, 1927.

Chilata. $13^{\circ}39' N.$, $89^{\circ}34' W.$ —This is a large coffee and balsam hacienda lying near the summit of the Balsam Range at an elevation of about 2,000 feet. Except in the beds of the numerous rocky ravines the original forest cover, save for scattered balsam trees, has been entirely removed and replaced with coffee groves. Although part of the general volcanic coastal system, the Balsam Range is obviously very much older than the present partially active chain

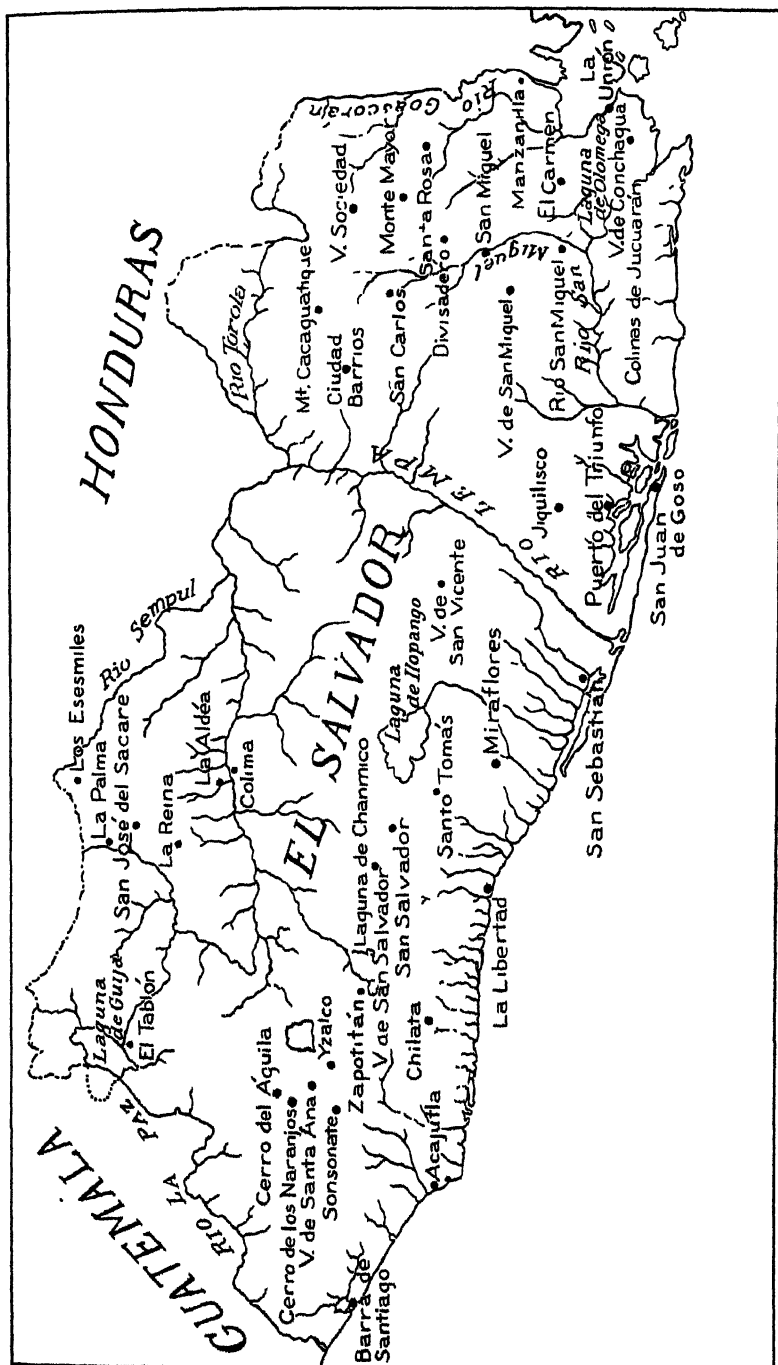


FIG. 1. Map of El Salvador showing collecting and observation stations.

which runs parallel to the coast about twenty miles inland and which includes the volcanoes of Santa Ana, San Salvador, San Vicente, and San Miguel. All surface flows on the Balsam Range have been completely eroded away, leaving precipitous walls of fine-grained, formerly deep-lying lava exposed. The range runs from just east of Acajutla, east along the coast to the vicinity of La Libertad, and thence swings north to merge with the Volcán de San Salvador. Commencing with low hills near Acajutla, the ridge rises abruptly a short distance east, the crest varying in elevation from some 2,000 feet at Chilata to 3,500 feet at the junction with Volcán de San Salvador.

Ciudad Barrios. $13^{\circ}48'N.$, $88^{\circ}16'W.$ —A coffee town of several thousand people which lies at the junction of the Arid Lower and Arid Upper Tropical Zones at an elevation of 2,500 feet on the western slopes of Mount Cacaguatique. As in most coffee districts, the former forest cover, which here consisted chiefly of broad-leaved, deciduous oaks and long-leaved pine, mixed to a certain extent with the more hardy of the Lower Tropical *silva*, has been cut off, and the region is now almost wholly planted to coffee. No collecting was done here, but many species of birds were observed from November 16 to 19, 1925, while arrangements were being made for a more favorable collecting ground higher on the mountain. The town was formerly known as Cacaguatique and was recently renamed Ciudad Barrios.

Colima. $13^{\circ}59'N.$, $89^{\circ}06'W.$ —A large hacienda in the valley of the Lempa at the confluence of that stream and the Rio Acelhuate. The elevation is 1,000 feet. The Lempa River Valley at this point is a roughly oval area about two miles wide by five long. Old surface flows of lava make a low boundary of hills on the south and west, while the sloping alluvium from the cordillera performs similar service on the east and north. The valley floor itself is perfectly flat and is checkered with sugar cane, grassy pastures, old weed-grown fields and occasional banana groves. Through this valley the Lempa runs in winding course, its banks in places bordered by extensive willow fringes. At one place in the lava hills the erection of an artificial dam has created a marsh some twenty acres in area, in which several species of interest were collected or observed. There is no large timber in the vicinity. A tongue of the southeastern avifauna reaches up the river valley to this point.

Colinas de Jucuarán. $13^{\circ}15'N.$, $88^{\circ}05'W.$ —A line of hills, 2,200 feet in elevation at their highest points, lying between Lake Olomega

and the ocean (pls. IV and XIII). Their westernmost foothills reach nearly to Triunfo Bay, and their eastward extensions merge with the western slope of Volcán de Conchagua. They are entirely volcanic in origin and are probably contemporaneous with the Balsam Range. Except for occasional outcrops of lava these hills are rounded and bear a dense, arid deciduous forest to a mean elevation of 2,000 feet. Above that they support a few small patches of stunted trees and occasional pines, but for the most part are covered with a thick growth of coarse grass. The woods on both slopes are uninhabited and afford a beautiful example of primeval Arid Lower Tropical hill forest. Several birds and mammals which have disappeared from most other places have maintained a foothold here, and intensive research could not fail to give interesting results. In the present survey approximately a dozen one-day trips between July 27 and September 20, 1925, were made to the Colinas from a base camp at Lake Olomega.

Divisadero. 13°37' N., 88°04' W.—An old mining town situated at an altitude of about 800 feet in the lower foothills of the cordillera. Geologically, the region is of folded sedimentary strata, now eroded to low levels and covered in most places with more recent lava intrusions and surface flows. The underlying, older strata are highly mineralized and have in the past yielded great wealth in gold and silver. The region for miles in every direction has been absolutely stripped of the original forest cover, and at present the low, rounded hills are covered chiefly with grass and thickets of *Acacia* and *Mimosa*, with a few trees here and there along the numerous small streams (pl. XIV). These grasslands and thickets yielded many specimens of the "lost" *Colinus leucopogon*, and mine tunnels were certainly the center of the barn owl population of the surrounding territory, as well as of many interesting species of bats. The fall migrations of many birds were observed here, and the scarcity of woodland proved of decided assistance. Quarters were established at the house of G. A. Swanquist, resident manager of the mining syndicate controlling the region for many miles around. Work was not continuous in this one locality, for several side trips were made to other stations such as Rio Goascorán and Monte Mayor.

El Carmen. 13°25' N., 87°55' W.—A small village on the coastal plain. Several species were shot nearby during night hunting from headquarters at Lake Olomega and Rio San Miguel.

El Tablón.— See Lake Guija.

Granadillas.— See Volcán de San Salvador.

La Aldéa. $14^{\circ}02' N.$, $89^{\circ}07' W.$ —A collection of half a dozen huts at an altitude of 1,500 feet on the barren *Crescentia* plateau between the cordilleran foothills and the Lempa River, where the stony ground is thinly covered with a starved growth of thorny trees and a little grass. The place was visited only one day from headquarters at San José del Sacare. It is of interest as being the only locality in the country where the Western Lark Sparrow was found.

La Libertad. $13^{\circ}31' N.$, $89^{\circ}19' W.$ —An open roadstead dignified by the title of "seaport." The town has some 2,000 people and is the coastal terminus of the automobile road from San Salvador. At this point there is no coastal plain, for the foothills of the Balsam Range reach nearly, or, in many places, quite to the shore. The hills, which of course are old lava flows, are covered with a low, thin, scrubby growth. The vicinity offers little of interest, for all of the original ground cover has been removed, not once, but many times. No collecting was done here, but several species were observed at various times. W. B. Richardson collected here for a short time in the early spring of 1891, and many specimens taken by him are recorded in the *Aves* section of the *Biologia Centrali-Americana* and in the *Catalogue of Birds of the British Museum*.

La Palma. $14^{\circ}14' N.$, $89^{\circ}11' W.$ —This town of 2,000 to 3,000 inhabitants lies in the upper Lempa Valley at an altitude of 2,400 feet. Topographically the locality is a very attractive one of rounded hills which are well forested with "ocotes" or long-leafed, pitch-producing pines of the species (*Pinus oocarpa*) common to the Arid Upper Tropical Zone almost throughout the country. Along the water-courses fingers of the Arid Lower Tropical extend upward nearly to 3,000 feet, and into these places many forms penetrate from the lowlands. A "road," passable for pack trains, but not for carts, runs through here and is the only means of communication between this part of El Salvador and southern Honduras. Many species were noted about La Palma while en route to Los Esesmites, and again on the return journey, but no specimens were collected.

La Reina. $14^{\circ}07' N.$, $89^{\circ}10' W.$ —Situated at about 2,000 feet altitude in the foothills of the cordillera. The town itself lies in the upper fringes of the Arid Lower Tropical Zone, but on the ridges just above it begin the characteristic pines and broad-leafed, deciduous oaks of the Arid Upper Tropical Zone. A few birds were observed here while we were en route to the high mountains, but no specimens were taken.

La Unión. 13°20' N., 87°50' W.—This seaport on the western arm of the historic Gulf of Fonseca has been a port of call for most of the ships engaged in trade or exploration from the days of Drake down to the present time. It was originally known as "San Carlos," but during the political upheavals following independence the name was changed to La Unión. The old name, however, persisted for many years and has caused some confusion. La Unión was visited by Captain Belcher in 1838, and his two ships, the *Sulphur* and the *Starling*, were here or at nearby places on the Gulf almost continuously from November 19 to December 30 of that year. Some birds were collected by his party, but unfortunately no list of them appears to be extant. A few years later, some time in 1841, P. A. Lesson, then a surgeon aboard *Le Pylade*, made collections here, and the new forms were later described by his brother. Captain Dow took occasional specimens here in the early '60's, as did Osbert Salvin in March, 1863, when the latter was a passenger on Captain Dow's vessel en route from Guatemala to Panama.

At present the place is a busy one, since it is the terminus of the International Railway of Central America, and contains many thousand people. Because of the density of population, it was not practical to do any collecting in the immediate vicinity of the town, but closely adjacent areas were well covered. The town lies at the northern foot of the Volcán de Conchagua, from which old lava flows reach well into the city itself. The hills are covered with the usual type of second growth woods and scrub, while to the northwest begins, rather abruptly, the coastal plain surrounding the northern part of the Gulf.

Lake Chanmico. 13°45' N., 89°22' W.—This is a very small and very deep lake lying at the head of the comparatively broad, and in places nearly level, valley running northwest from Acajutla through Sonsonate and Zapotitán and shut off from the coast by the Balsam Range. The elevation is some 1,500 feet, but due to the marshy conditions prevailing and the pocketed position behind the coast range, the air is usually close and humid. In consequence the silva and fauna are very similar to those of the coastal plain. The vegetation is much more luxuriant than is usual at this altitude. Although the lake itself has no shoals except at one or two points, the dense tangle of growth close to and overhanging the water makes an ideal situation for the temporary sojourn of waterbirds such as herons and grebes. The country surrounding the lake is a checkerboard of cornfields, grass and mimosa pastures, and sections of large

forest, although the last is being rapidly cut down. Indeed, the removal of timber had so altered the appearance of the region that in the interval between 1912 and 1927 it was scarcely to be recognized as the same place.

Lake Guija. $14^{\circ}15' N.$, $89^{\circ}35' W.$ —The second largest lake in El Salvador. It is situated at 1,450 feet in the extreme northwest corner of the republic, and part of the lake extends into Guatemalan territory. Most of the surrounding region is a jumble of fairly recent lava flows which show but little erosion, and which are now covered with a fairly thick growth of forest, typical of the foothills of the Arid Lower Tropical Zone. Except for a few winding trails the woods are difficult to traverse, for the lava flows are exceedingly rough in character and abound in pits and cavities which are often hidden from view with a light covering of fallen branches and leaves. About the southern end of the lake are numerous small meadows intersected by winding streams, the backwaters of which often make small pools and marshes of limited extent. Mimosa and willows are the dominant growth along these streams along with occasional gigantic wild fig, conacaste, and ceiba trees. The meadows are usually a tangle of grass and thorny scrub. The lake offers but little inducement for waterbirds, for the shores are rocky and there is little shoal water to give a foothold for marsh growth. Collecting here proved the region to be overwhelmingly Guatemalan in its affinities. Headquarters were established at the railroad construction camp at El Tablón on the southeast shore and all collecting (May 22–31, 1927) was done within a five-mile radius of that place.

Lake Ilopango. $13^{\circ}40' N.$, $89^{\circ}00' W.$ —A large lake, covering roughly thirty square miles, situated at an elevation of 1,370 feet in the broken highland between the volcanoes of San Salvador and San Vicente. It is very deep and owes its origin to volcanic activity. The shores are precipitous and entirely of lava and ash. There are no shallows to speak of, and hence there is no ground to support the marsh growth so necessary for the existence of a waterbird population. The whole surrounding region is intensively cultivated, and there are several country homes and hotels on the lake shore. The bird life in no way differs from that of the coastal foothills in general.

Lake Olomega. $13^{\circ}20' N.$, $88^{\circ}00' W.$ —The third largest of the Salvadorean lakes (pl. IV). It is situated on the coastal plain at an elevation of 200 feet and, owing to the fact that its area fluctuates with the flow of the San Miguel River, it varies considerably in extent. It averages between fifteen and twenty square miles in area.

The south shore is stable and is formed by the foothills of Colinas de Jucuarán. The north, east, and west shores depend on the inflow. The north shore in particular is a gently sloping flat whose gradient is so gentle that one may walk a hundred yards or more out into the lake and still be no more than waist deep. This shallow area is grown, in the main, with great beds of water plants, alternated with mud flats, sandy beaches, clumps of thorny mimosa (chiefly *Mimosa pudica*), and numerous little bayous which wind back into the swamp forest bordering high watermark. As may be imagined, such an area is permanently inhabited by many marsh-loving birds and temporarily by swarms of migrants. With the possible exception of Los Esesmiles, no region in El Salvador would better repay long continued, intensive investigation than this, not only because of the teeming bird life on the lake, but because within easy walking distance are the primitive forests of the Colinas de Jucuarán and the swampy jungles to the north and east. Over two months were spent in this most interesting locality, from July 27 to September 20, 1925, on the lake itself and in the Colinas, and from April 5 to 15, 1926, in the forests of the north shore. In addition, several one-day excursions were made from Rio San Miguel in February, 1926. These many days did not by any means exhaust the possibilities, for we scarcely passed a day without seeing or collecting some species not previously met.

Los Esesmiles. 14°17' N., 89°07' W.—This is in a relatively short range of mountains rising abruptly from 2,400 feet at the Lempa River to 9,000 feet at the summit. To the north it merges with the great Honduran highland ranges, of which it is an integral part, and to the south and east it drops off gradually in a series of plateaus and lesser ridges. Los Esesmiles is unnamed on any maps, so far as we have learned. It is, however, known to all residents of the country under one or another variation of the name here used. The present spelling is that in use among the inhabitants of the mountain itself. The southern exposure is, except for the very summit, entirely Arid Upper Tropical in character with pines and oaks persisting, practically to the exclusion of other growths, to 8,700 feet. The north slope and summit are within the Humid Upper Tropical Zone, dripping wet throughout the year, and the gigantic oaks and other hardwoods are so covered with parasitic growth that their identity is often difficult to determine except by the foliage far overhead (pls. IX and XIX). The undergrowth consists of tree ferns and rather thin, light-starved, deciduous shrubs, while the ground is covered

with fallen trees, branches, and leaf mold, all concealed beneath a deep carpet of moss and smaller ferns. All of this growth is dependent on moisture from the clouds driven over from the distant north coast. In the early morning, there are no clouds to be seen except for an approaching bank to the northward. By ten o'clock the woods are filled with dense, driving fog which, condensing on the foliage, soon takes on the character of rain, and little rivulets start running along the trails. These clouds do not pass the summit for more than a few hundred feet before being absorbed by the dry warm air of the south slope. The zonal division here between Arid Upper and Humid Tropical is so sharply demarcated that it is possible, in many places, to stand in cold, dripping forest and look a few hundred yards away to the light, sunny slopes where normally not a drop of rain falls during five or six months of the year. With such diversity of conditions, in a little area of some twenty square miles comprising the chief outpost of vast areas of similar country in the highlands of Honduras, it is not surprising that six weeks were very profitably spent in the region. This period, from February 1 to March 10, 1927, was all too short to make more than a cursory survey. Several species were seen which were total strangers and never were collected, and it is certain that several months would be necessary to become even fairly well acquainted with the many and varied forms of bird and mammal life to be found.

Manzanilla.—See Rio Goascorán.

Miraflores. $13^{\circ}30' N.$, $89^{\circ}03' W.$.—A large estate given over to cattle, sugar, bananas, and other diversified products and situated at the abrupt junction of the coastal plain and the foothills. Although most of the arable land is under cultivation, there exist many good collecting places along the Jiboa River and in the tree-bordered, grassy pastures on the plain. The region proved mildly interesting from a distributional standpoint but, beyond this, scarcely repaid the four days' collecting from June 4 to June 8, 1927.

Monte Mayor. $13^{\circ}42' N.$, $88^{\circ}00' W.$.—The name of a mine (now abandoned) in the cordilleran foothills. It is situated at the southern foot of a low mountain, somewhat more than 3,000 feet in height, known as Volcán de Sociedad. Monte Mayor is at an elevation of 1,000 feet in a broad-floored cañon, through which runs a fair-sized stream with well-wooded banks. The surrounding country, as usual after mining activity, is stripped bare of all sizable timber and is now checkerboarded with cornfields and second growth. There are a few patches of forest on the mountain slopes, but the uppermost

levels are barren and support only a few scrubby pines. A four days' tour of observation (October 6 to 9, 1925) was made, covering the country between Monte Mayor and Volcán de Sociedad, but the lack of original forest made it an undesirable location for further work. It may be noted that in Central America any mountain may be known as a "Volcán" no matter what its geological history.

Mount (or Montes de) Cacaquatique. $13^{\circ}48' N.$, $88^{\circ}14' W.$ —This is the highest point in the roughly northwest and southeast series of folded mountains in the northern part of the Oriente (pl. III). From the summit at about 4,000 feet altitude, the elevation drops off abruptly along the southern face and more gradually to the west, north, and east. The Arid Lower Tropical Zone extends upward to a mean elevation of about 2,500 feet, ascending at least 1,000 feet higher in ravines and watercourses. Above these levels the region is predominantly one of oak forest with occasional patches of pines, and is essentially Arid Upper Tropical in character (pl. VIII). Near the summit the woods often resemble the Humid Upper Tropical Zone in their growths of moss and parasitic plants, and a few Humid Upper Tropical birds occur. In many places the ground has been cleared of original forest and replanted to coffee and the types of shade trees necessary to its successful culture (pls. XV and XXIII). However, some areas, occasionally of considerable extent, are as yet untouched. While here, headquarters was a coffee finca on the southwest slope of the mountain. This, known as Finca San Felipe, is situated at 3,500 feet, an ideal place from which to work downward into the Arid Lower Tropical, or upward into the Arid Upper Tropical. There were probably more species of birds present than before clearings had been made, for near the buildings were small pastures, cornfields, and banana groves, all of which attracted forms which were not found in the uncut tracts.

Olomega. $13^{\circ}23' N.$, $87^{\circ}59' W.$ —A railroad stop and fishing village on the east shore of Lake Olomega (pl. IV).

Puerto del Triunfo. $13^{\circ}16' N.$, $88^{\circ}32' W.$ —An abandoned seaport on the north side of the great network of tidal estuaries known collectively as Triunfo Bay (pl. XVII). The tidal lagoons are of the type so well known in tropical America—open channels bordered with impenetrable mangrove thickets and dotted with "islands" of mangroves wherever comparatively shallow water affords a foothold. About the town, now inhabited only by a few score fishermen and rubber gatherers, are old groves of bananas, cocoanuts, and oranges, old grasslands now grown head high, and here and there small

cornfields. Elsewhere, stretching all along the north shore of the bay and for two or three miles inland, is a swamp forest of immense size where conditions are absolutely primitive except for a nearly obscured cart road and the wandering trails of the rubber gatherers. The undergrowth is principally of *Bactris subglobosa*, the coyol, or huiscoyol palm (pl. XVIII). Small, winding watercourses are numerous and frequently culminate in impassable bogs as they approach tidewater. The bay proper is separated from the ocean by a long, narrow, sandy peninsula, evidently a slightly elevated ridge of sand dunes, which for the most part is grown with light, open, medium-height forest. This peninsula, which is known as San Juan de Goso, is uninhabited except for a small collection of huts at the eastern end. The period from December 30, 1925 to January 27, 1926, was spent about the bay. Quarters were established in the old hotel, which was found to be tenantless except for swarms of rats and colonies of bats.

Rio Goascorán. 13°30' N., 87°44' W.—A point on the Rio Goascorán, the course of which marks the eastern boundary of El Salvador, where, at the junction of coastal plain and foothills, a few days' collecting was done from October 25 to 30, 1925. The region is rather intensively cultivated, and there are no woods to speak of other than some second growth along the streams and river banks. For the most part the broad river plain is the uninteresting savanna (grass and mimosa) association common to unforested lowlands, while the foothills behind are covered with a scrubby growth of woods. Very little of interest was encountered beyond the expected extension of the ranges of some southeastern forms to the extreme eastern point of El Salvador. The elevation of the ranch at which Stirton and van Rossem lived, which is known as Manzanilla, is 100 feet.

Rio San Miguel. 13°25' N., 88°04' W.—This point on the San Miguel River is some three miles northwest of Lake Olomega (pl. XXIV). The three weeks from January 31 to February 22, 1926, were spent in collecting in the swamp forest between this point and the lake, though a few one-day excursions were also made to the lake itself. Headquarters were made at a large cattle ranch, and consequently the region was found to be even more interesting than totally primitive forest because of the occasional open grassy pastures scattered here and there. The whole country hereabout is impassable in the rainy season, at which time people and cattle are forced to move inland a few miles. As illustrative of the extremely local distribution of many species, it may be noted that some were

encountered here which were totally absent from Lake Olomega; others were abundant at one place and decidedly rare at the other.

San Carlos. $13^{\circ}43' N.$, $88^{\circ}06' W.$ —A small town or village near the southern base of Mt. Cacaguatique. No specimens were collected here, but several species were noted on two occasions. The vicinity is similar to that about Divisadero, that is, stripped of timber, with the semibarren, rolling hills now covered with scrub. This is, of course, not the "San Carlos" of Lesson, for which see La Unión.

San José del Sacare. $14^{\circ}12' N.$, $89^{\circ}10' W.$ —This small village of a score of houses lies in the cordilleran foothills at an elevation of 3,600 feet. The surrounding country is almost entirely Arid Upper Tropical in character, and the tree growth consists mainly of pitch pines with broad-leaved deciduous oaks along the watercourses. In several places fingers of Arid Lower Tropical vegetation provide limited habitat for lowland species and the avifauna is, therefore, of a mixed character. The locality is essentially like Mt. Cacaguatique, but it is inhabited by several species which follow the general pine growth south from Guatemala and which do not occur on Mt. Cacaguatique because of its isolated position.

San Juan de Goso.—See Puerto del Triunfo.

San Miguel. $13^{\circ}31' N.$, $88^{\circ}08' W.$ —The town, the largest in the Oriente, has an elevation of some 300 feet and is near the edge of the first (northern) foothills. The surrounding region provides little of interest, for the town has been occupied since the time of the Spanish conquest and consequently all original forest cover has long since been removed. It is now the center of the henequin industry and much of the land is given over to that. Nevertheless, many species were noted in the fall of 1925 when we were passing through or while stopping en route to other points.

San Salvador. $13^{\circ}45' N.$, $89^{\circ}09' W.$ —A good deal of work was done about this, the capital city of the republic, between February 22 and May 1, 1912. Most of the collecting was done in the "barrios" or wards of Mejicanos and San Jacinto, both of which are suburban districts of country houses and small farms. These farms are given over to highly diversified agriculture. Bird life is in consequence abundant as regards smaller species, although many of the larger ones have been completely extirpated. The city lies at 2,300 feet elevation near the eastern foot of the volcano of the same name. The terrain is a sloping plateau cut deeply with innumerable ravines and watercourses. It lies wholly within the Arid Lower Tropical Zone.

San Sebastián. 13°38' N., 87°58' W.—An abandoned mining camp in the foothills northeast of Divisadero. A few birds were noted or collected there on the evening of October 9, 1925, while en route from Monte Mayor to Divisadero. In the body of this report, reference to San Sebastián does not pertain to this locality unless designated in addition as Department La Unión.

San Sebastián. 13°22' N., 88°55' W.—This locality is the San Sebastián to which belong all records mentioned unless otherwise stated. It is on the edge of the large salt water lagoon known as Concordia Bay. The group of four or five grass huts which are collectively known as San Sebastián are on a small knoll just above the reach of high tide. The overflow from the Lempa River makes this an area where both salt and fresh water mingle to produce an almost impenetrable maze of mangrove swamps, coyol-palm thickets, tule marshes, and swamp forest. Because of the swampy nature of the ground, which is almost entirely under water during the rainy season, the district is practically uninhabited. Original conditions are altered only to the extent of a few ill-defined cattle trails on higher ground and occasional palm-thatched huts used from time to time by shrimp catchers. The place was once the site of large colonies of egrets and snowy herons, but the former are now uncommon and the latter apparently have been entirely shot out. The period from July 13 to 31, 1912, was spent here, with attention centering principally on marsh birds. Further work could hardly fail to produce interesting results, for several unidentified species were seen that were not subsequently met with anywhere in the country.

Santa Rosa. 13°38' N., 87°55' W.—No collecting was done at this town of several thousand population, but several species were noted at or near the place in traveling to and from Rio Goascorán in October, 1925.

Santo Tomás. 13°38' N., 89°06' W.—A hill village at an elevation of 1,800 feet on the road between San Salvador and Miraflores, where some interesting species were noted, but none collected, on June 4 and 9, 1927.

Sonsonate. 13°46' N., 89°43' W.—The region is intensively cultivated and almost entirely deforested. It is situated at an elevation of about 1,500 feet at the foot of the active volcano of Yzalco. This locality was not worked personally, but Dr. Loye Miller and Dr. Alden Miller spent about two weeks near there in July, 1925. Most of their specimens were collected a short distance

northwest of the town at Yzalco, the government agricultural station.

Volcán de Conchagua. $13^{\circ}17' N.$, $87^{\circ}51' W.$.—This long extinct, volcanic mountain is evidently about the same age as the contiguous Colinas de Jucuarán and the Balsam Range and antedates by a great period of time the present active chain of volcanoes which runs parallel to the coast some fifteen miles inland. Most of the crater has been eroded away, and the greater part of the present summit is a rolling plateau. The Arid Lower Tropical Zone extends upward to about 3,500 feet on the north slope and to about 2,500 feet on the south side. From sea level upward there is a fair-sized forest, cleared in large patches for corn on the lower levels; above 2,000 feet only the underbrush has been removed in order to make room for coffee bushes. The upper 200 or 300 feet are covered with groves of pines alternating with open grassland, and are characteristically Arid Upper Tropical (pl. VII). Curiously enough there are no oaks, although these are, in all other highland regions, generally distributed above 3,000 feet and locally even down to 2,500 feet. There is a marked absence of Arid Upper Tropical Zone birds, for only *Geococcyx velox affinis*, *Salpinctes obsoletus guttatus*, *Icterus chrysater chrysater*, and *Buteo albonotatus* are present. Because of the absence of competing forms, lowland species are common clear to the summit, which was not true anywhere else in the country. Historically the mountain is of interest as being the locality in which Salvin observed the rock wren and a few other species in March, 1863.

Our very accurate barometer registered only 3,600 feet at the top of Pine Peaks, the highest point on the mountain which is reputed to be 4,000 feet in height. In the absence of mountain forms the locality proved of insufficient interest to spend more than a couple of weeks. In addition a continuous gale made collecting extremely difficult except in a few sheltered spots.

Volcán de San Miguel. $13^{\circ}28' N.$, $88^{\circ}11' W.$.—This easternmost of the active volcanoes is an almost perfect cone rising out of the wide coastal plain to an elevation of 7,000 feet (pl. III). The lower slopes are covered with a rather thin forest which extends upward to a mean of some 2,700 feet and then gives way abruptly to old lava flows, covered for the most part with bunch grass, agave, candleberry bushes, and occasional oak groves (pl. XI). This Arid Upper Tropical belt continues in places nearly to the summit, gradually becoming more barren until, near the crater, all organic life

disappears because of frequent minor eruptions with their consequent showers of cinders or ash and clouds of gas. The lip of the crater is lower on the south slope, and consequently vegetation ceases at about 5,000 feet. On the north side the oak groves, under which coffee has been planted, reach much higher. There are no permanent streams, and water for domestic use is stored in cisterns during the rainy season. From the west flank runs a series of ridges, the highest points of which are known respectively as Volcán de Chinameca, Volcán de Jucuapa, and Volcán de Usulután. The last named is by far the highest and reaches an altitude of approximately 4,500 feet. They are integral parts of Volcán de San Miguel and are probably old minor cones, bearing much the same relation to the "mother" mountain as do Cerro de Los Naranjos, Cerro del Aguila and Yzalco to Volcán de Santa Ana. Collections were made on Volcán de San Miguel between March 11 and 27, 1926. The mountain had previously been visited by W. B. Richardson in March, 1891.

Volcán de San Rafael.—See Volcán de San Salvador.

Volcán de San Salvador. $13^{\circ}45' N.$, $89^{\circ}14' W.$ —Although this volcanic mountain reaches an extreme elevation of 6,800 feet, this altitude is the result of a sharp peak, the only remaining piece of the oldest crater rim. The present crater is only about 5,000 feet above sea level and is but little above the mean of the ridge which curves southwestward to form the Balsam Range. Practically all the former forest has been cut off, and the mountain is now devoted almost wholly to coffee culture. The few scraps of timber remaining on the northern and northwestern slopes indicate that the cloud forest of the Humid Upper Tropical Zone commenced at about 3,500 feet as it does on Volcán de Santa Ana at the present time. The conversion of the ground on the southern and southeastern slopes to corn and agave fields has naturally resulted in a material extension of several lowland species. Comparatively little work was done on this mountain. April 12, 1912, was spent on the open Arid Upper Tropical east side, and May 29 to June 4, 1912 on the north side at an elevation of about 4,500 feet in one of the few remaining patches of cloud forest. The coffee finca which was headquarters for work on this mountain is known as Granadillas or occasionally as Volcán de San Rafael.

Volcán de San Vicente. $13^{\circ}37' N.$, $88^{\circ}45' W.$ —No collecting was done on this mountain, for the original conditions have been so altered that it is doubtful if more than the commonest and most widespread forms remain. It is cultivated nearly to the summit and

virtually all of the forest has been removed. It is approximately 7,000 feet in height.

Volcán de Santa Ana. $13^{\circ}52' N., 89^{\circ}37' W.$ —With the exception of Los Esesmites this mountain is by far the most attractive highland locality from the standpoint of a naturalist. Although but slightly higher than the volcanoes of San Salvador, San Vicente, and San Miguel, it differs from them in being the highest point of a comparatively large area of mountainous country rather than a single sharp peak of limited area. The main cone rises to 7,200 feet through a series of rounded mountains which include the 6,000-foot Cerro del Aguila and the equally high Cerro de Los Naranjos. The south and east sides are the most precipitous, the former being the site of the most recent outbreaks of volcanic activity (Volcán de Yzalco) and the latter dropping sharply to Lake Coatepeque. The north and west sides above 4,000 feet are well within the Humid Upper Tropical Zone. The cloud forest (pl. XXII), although not so dense as on the higher Los Esesmites of the interior cordillera is, nevertheless, well developed, and the two mountain areas are inhabited by numerous species (but not necessarily subspecies) common to both. The upper levels of the south side and the summit itself are distinctly Arid Upper Tropical in character. Collecting, either on the main cone or on the flank cones of Cerro de Los Naranjos and Cerro del Aguila, was carried on between May 5 and 21, 1927, with headquarters at Finca Santa Marta at 4,500 feet.

Volcán de Sociedad.—See Monte Mayor.

Zapotitán. $13^{\circ}46' N., 89^{\circ}28' W.$ —The name of a large hacienda lying in a basin between the Balsam Range and the broken plateau country to the north. The altitude at the center of the basin is 1,500 feet. Until recently the area was devoted to raising cattle, but it is now being intensively cultivated by modern methods. The lower ground is an immense swamp in the rainy season, the overflow draining off into the Río Sucio and thence north to the Lempa. This low area is known as Lake Zapotitán, although it is little more than a bog, even in the wet season. Here is some primitive swamp forest of fair size, but the nature of the ground makes collecting difficult. It is wholly within the Arid Lower Tropical Zone.

TOPOGRAPHY

To comprehend properly the distribution of bird life in El Salvador an appreciation of the main topographic features is necessary (pl. II). A short distance to the northwest of El Salvador the great

Pacific mountain system of Guatemala begins to break up into two, roughly parallel, east and west ranges whose division becomes complete in western El Salvador. The northern branch, a part of the great Central American section of the continental cordillera of folded mountains, skirts the northern border of El Salvador, swings eastward across southern Honduras and eventually dies out in central Nicaragua. The more southerly fork, entirely of volcanic origin and still sporadically active, extends eastward across southern El Salvador at a distance of about twenty-five miles from, and parallel to, the Pacific Ocean and continues on down the Nicaraguan coast to Costa Rica. The northern range maintains a high average level in northern El Salvador and southern Honduras, while the southern range consists chiefly of sharp peaks which rise at evenly spaced intervals from connecting foothills or lowlands. Locally one of these peaks, Volcán de San Miguel, is effectually isolated from its sister mountains, and also from the cordillera by hot lowlands. Significantly enough this mountain is the center of the only well-defined faunal area which has been demonstrated in the two years of intensive field work in this country.

The great central valley, which is due to the relatively recent creation of the coastal range, is drained for the greater part of its length by the Lempa River and its tributaries. The extreme western part is little more than a saddle of broken hill country with a minimum elevation (at Lake Guija) of 1,450 feet, across which the cordilleran and coastal ranges are more or less closely connected. As the valley gradually sinks eastward it broadens and becomes less broken; it is constricted once more at its junction with the Torola River and finally merges with the coastal plain in the east-central departments.

South of the coastal range and varying in width is the coastal plain which is divided into an eastern and western section by the encroachment of the ancient coast mountains known as the Balsam Range.

The accompanying map (p. 15), modeled from a composite of all the more reliable data available to us and checked by many personal field observations, may be relied upon to show all the major features referred to and most of the minor ones, some of which it has not been necessary to mention. Its main purpose is to enable the reader to visualize the topography of El Salvador when considering general problems, and the details of distribution.

CLIMATE

Rainfall. For the past two decades the El Salvador section of the International Railways of Central America has kept rainfall and other meteorological records at numerous points along its right of way, which runs in a general line from Lake Guija in the extreme northwestern corner of the country to La Unión in the extreme southeast. This line at no point exceeds 2,500 feet in altitude so that while the data include nothing from highland localities, they do give a most helpful summary of the climatic conditions to be

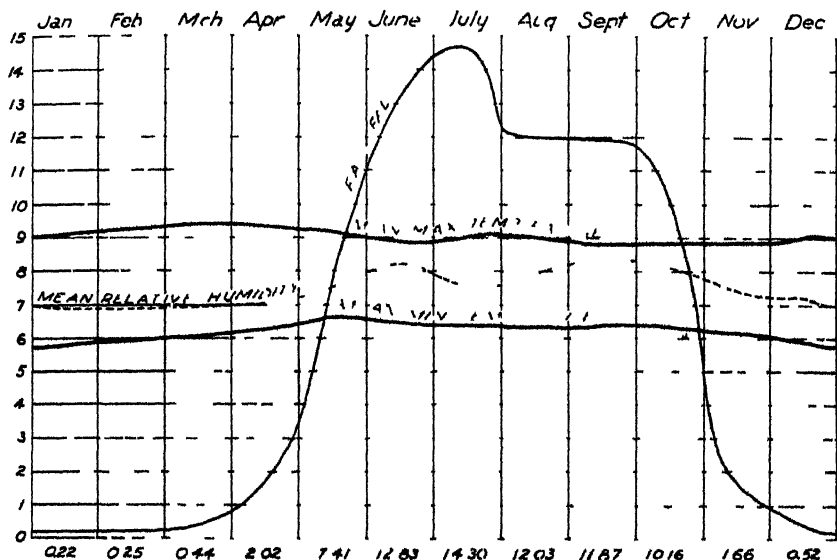


FIG. 2 Climatic summary for the Arid Lower Tropical Zone

encountered in the "Tierra Caliente." These data have been published by the *Observatorio Nacional Meteorológico de San Salvador* and, thanks to the kindness of F. W. Taylor, it has been possible to study those gathered from 1912 to 1930, inclusive. While nineteen years is too short a time upon which to base true averages, the data seem to be sufficiently numerous to provide an approximate idea of the climate of the arid division of the Lower Tropical Zone in El Salvador as well as, in a more general sense, the climatic conditions to be found in many parts of the western lowlands of Central America.

Rainfall or its absence furnish the only basis upon which the year can logically be divided, since the temperature and, peculiarly

enough, the relative humidity vary but little from month to month. The two sharply differentiated periods are the wet season or "winter," which covers roughly the seven months from the middle of April to the middle of November, and the dry season or "summer," which lasts from the middle of November to the middle of April. It is during the wet season that practically all the annual precipitation of some 73 inches occurs, and for the rest of the year the skies are normally cloudless except for an occasional shower. Spring and autumn, the transitional periods of more northerly latitudes, are virtually nonexistent, and indeed even the names mean little or nothing to the native population. It is true that some of the trees, *Ceiba* for example, have a blossoming period in January and February, a few weeks prior to the rains, but, for the most part, all succulent vegetation dries up, and the majority of trees and shrubs are leafless after the middle of December and until the first hard rains in mid-April.

Of course the dates given above vary somewhat from year to year. There may be little or no rain until well along in May and precipitation may cease by the first of November; again the rains may begin in March and showers be experienced until December or even January. However, if one accepts the nineteen-year average as a fair mean, the rainy season or "winter" may be called that from April 15 to November 15, while the dry season or "summer" takes up the remainder of the year.

It must not be supposed that the term "rainy season" denotes continuous rain or even continuously cloudy skies. Most of the rains come as hard downpours which usually occur in the afternoon or early evening and which may last for an hour or two only. Storms occasionally arise which endure for several days, but normally the skies are clear in the forenoon at least. The chief drawback from a field worker's standpoint is the inaccessibility of some regions during this season. Mosquitoes, too, may become a serious problem if one happens to be in a malarial district. On the other hand the swarms of dry season ticks, which make collecting a real hardship in some places, disappear with the first rains, so that each season has its compensations and also its drawbacks so far as insect pests are concerned.

Arid Lower Tropical Zone.—The graph (fig. 2) which accompanies this section brings out clearly enough the fact that, aside from the sharply defined wet and dry seasons, the chief characteristics of the Arid Lower Tropical Zone in the region discussed are the

extraordinarily uniform and fairly high temperatures and high relative humidity, both remaining high throughout the year regardless of season. That the humidity should remain so high during the rainless season is a seeming phenomenon for which we cannot readily account, particularly as the prevailing winds are from the north and not from the sea. At any rate the mean annual humidity of 75% suffers a drop in the dry season to only 70% and rises in the rainy season to 84%. Temperature is even more uniform since the maximum monthly average remains through the year at close to 90° F. while the minimum monthly average hovers close to the 60° F. mark. The mean annual average is about 74° F. so there is only a fluctuation of some 15° F. between the high and low averages.

One may summarize the atmospheric conditions of the Arid Lower Tropical Zone in El Salvador by likening them to a blanket of warm, humid air of a temperature of 74° F. and a relative humidity of 75%, which perpetually covers the country to an altitude of about 2,500 feet. It is true that there are local variations, for the Lake Guija region and the upper Lempa Valley are quite arid both in appearance and in reality, and the coastal plain is relatively humid, but these variations are extremely local and, except for the consequent minor variations in environment, seem to have little effect on the distribution of the Arid Lower Tropical avifauna.

Arid Upper Tropical Zone. --For the Arid Upper Tropical Zone there are no data of rainfall or temperature available, nor in all probability are there any in existence other than the sporadically made observations of Stirton and van Rossem. These are too scanty to afford a basis for any definite conclusions, though they are valuable as indicating in a general way the climatic characteristics of this pronounced life zone which very uniformly covers the southern slopes of the highlands between the altitudes of 2,500 and 8,500 feet.

The rainfall of the Arid Upper Tropical Zone is seasonal and of a duration and intensity comparable to that occurring in the Arid Lower Tropical Zone. During the years 1912, 1925, 1926, and 1927, when our observations were made, the inception and cessation of the rainy and dry seasons were in strict chronological accordance with the same periods in the Arid Lower Tropical Zone; neither could we detect any significant difference in the number or intensity of storms. It would indeed be remarkable if the entire amount of

precipitation here should be found to be identical with that of the lowlands, but it probably approaches it rather closely.

It is probably safe to make the statement that the chief climatic feature of the Arid Upper Tropical, and the one which characterizes it in comparison with the Arid Lower Tropical, lies in the decidedly lower annual mean and annual minimum temperatures combined with a very much lower relative humidity during the dry season.

As the 2,500-foot level is reached when traveling into a highland locality, one almost immediately becomes pleasantly conscious that the oppressive air blanket of the lowlands has been left behind. Not only is it possible to take a reasonable amount of exercise without undergoing the questionable delights of a perpetual Turkish bath, but various other small annoyances automatically disappear in the dryer atmosphere. Ammunition, which has swelled to the point where major operations are necessary in order to load or unload a gun, resumes, after a few days, something of the size and proportions originally advertised by its makers and, best of all, bird skins dry naturally and quickly instead of having to be constantly watched and aired at every opportunity in order to prevent mold and rot. Brush fires which are almost impossible to start in the lowlands even in the dry season unless the growth has previously been cut and left to dry, may here become serious affairs, as was personally witnessed on more than one occasion. These illustrations are sufficient to indicate the lower relative humidity of the Arid Upper Tropical Zone during the dry season even though we had no hygrometer with which to note definite figures.

As to temperature the maximum average seems closely to approximate that of the lowlands (90° F.) at least up to altitudes of 7,000 feet. The minimum average, and in consequence the mean average, is, of course, decidedly lower than the Arid Lower Tropical figures. At our camp at 6,400 feet on Los Esesmites minimum temperatures during February and early March varied between 39 and 44 degrees. Frost, according to the inhabitants, is unknown, but hailstorms are said to occur rarely.

Humid Upper Tropical Zone.—The climate of this well-marked zone, which characterizes the north slopes of the Salvadorean cordillera to the summit at 9,000 feet and also the similar exposures on some of the more westerly coastal volcanoes from about 4,500 feet to their summits near 7,000 feet, differs radically from that of the two arid divisions in that rain is practically continuous throughout

the year instead of falling seasonally. There are no figures available to provide specific data, but the general statement is made that the rainfall certainly exceeds 100 inches and probably approaches 150 inches. During a not inconsiderable portion of the year precipitation is not measurable by ordinary means. The dense, tropical growth with which the north slopes of most of the higher mountains is covered owes its existence, in part, to the heavy, moisture-laden clouds which are brought in from the Atlantic by the prevailing north winds. As these clouds pass through the woods, a large amount of moisture is condensed on the foliage, so much in fact that the spongy soil and leaf mold is not only kept in a continual state of saturation, but some actual run-off takes place as well.

Nothing definite can be given as to temperatures or relative humidity, but again the general statement is made that the temperature is very much the same as in the Arid Upper Tropical, and the relative humidity is at least equal to and probably in excess of that of the Arid Lower Tropical. Even at the summit of Los Esesmites (9,000 feet) frost is said to be unknown. Certainly we observed none in February and early March of 1927.

It may be observed that in this zone all days are not rainy or even cloudy. On the contrary there are occasional intervals of several consecutive, warm, sunny days when areas of felled timber become dry enough to burn.

LIFE ZONES

General.—El Salvador lies wholly within that primary climatic division defined by Merriam¹ and others as the Tropical Region, that is to say, it possesses an equable climate of very constant and fairly high temperature with very little fluctuation in the daily and monthly means, a fairly high relative humidity, and a normal absence of frost.

Although the two other primary climatic divisions, the Boreal and the Austral [=Temperate] Regions have for many years been recognized as being divisible into several life belts or zones, the Tropical Region has not as a rule been similarly subdivided until relative recent times. The terms Tropical Region and Tropical Zone were practically synonymous long after the Boreal Region had

¹ North American Fauna No. 3, 1890; Proc. Biol. Soc. Wash., 7, pp. 1-64, 1892; and U. S. Biological Survey Fourth Provisional Zone Map of North America, as published in the Third (1910) Edition of the American Ornithologists' Union Check-list.

been divided into the Arctic, Hudsonian, and Canadian Zones, and the Austral Region had been recognized as having at least three divisions consisting of the Transition, Upper Austral, and Lower Austral Zones with further divisions when the two Austral Zones were again separated, on the basis of humidity, into the Austral and the Sonoran.

As a matter of fact the Tropical Region and the Tropical Zone are far from synonymous for in Central America the Region is easily divisible into at least four zones. Each of these possesses a climate, a flora, and a fauna which are characteristic and which combine to form a zone fully as well set off from the other three as are any of the zonal divisions of the Boreal and Austral Regions. With the increase in knowledge which has come from the renewal of activity in tropical North America during recent years, the zonal features of the Tropical Region have become generally recognized. With recognition have come various efforts at classification, some of them excellent and obviously based on familiarity with actual conditions. Perhaps the chief factor operating against universal recognition of the proposed divisions has been the multiplicity of terms used. Again, some of the proposed divisions are, if judged by the usual criteria, more properly to be considered as associations than zones since they clearly have been based on special or exceptional plant or animal communities or even upon the general appearance of a locality with but little consideration for the broader aspects of the problem.¹

Except for a few mountain summits which form isolated Temperate or Boreal islands of limited extent, the continental mass of Central America lies wholly within the normally frostless climatic area of even temperature known as the Tropical Region. The Atlantic slope, except for the northern portion of the Yucatan Peninsula and parts of interior Guatemala and a few other areas of more limited extent, has no sharply defined wet and dry seasons since the annual rainfall of about 150 inches is distributed throughout the year. The Pacific slope, on the contrary, is characterized by a long, rainless period of five or six months, and the annual precipitation is roughly half of that on the Atlantic side. The causes of this vital climatic difference are well known and need not be discussed here beyond

¹ In the *Naturalist's Guide to the Americas*, edited by Victor E. Shelford and published by the Williams and Wilkins Company, Baltimore, 1926, there will be found a world of information not only on the climate of tropical America, but on the concepts of many zoogeographers of note concerning "life zones," "biotas," and "natural life areas."

the brief explanation that the rain-laden, southward-moving trade winds, which blow from November to April or May, deposit their moisture almost entirely on the Atlantic side and after passing the continental divide have little or no precipitation left for the Pacific.

The great disparity in the character of the rainfall has resulted in decided variance in the types of vegetation to be found on opposite sides of the continent. Not only is there a pronounced difference in the luxuriance of the growth, but each side possesses in addition its peculiar subspecies, species, and even genera of plants and animals. These differences have impressed themselves on every explorer and

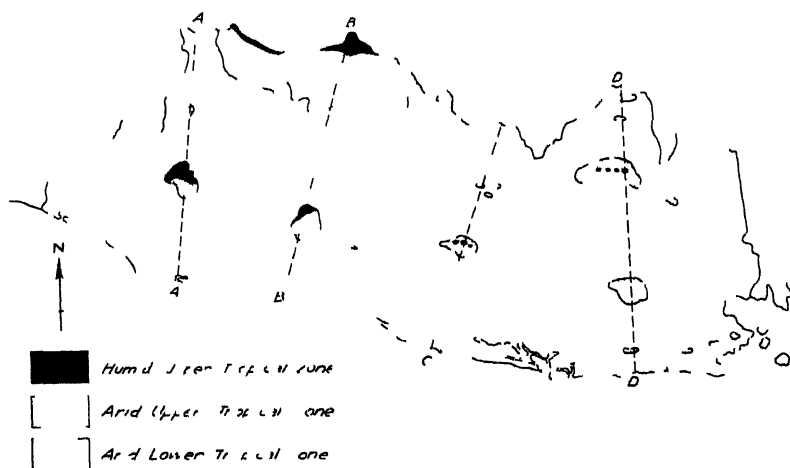


FIG. 3. Distribution of life zones

collector since the earliest times, but it is only within relatively recent years that their significance has been understood. The terms Humid Lower Tropical Zone and Arid Lower Tropical Zone appear to have been generally accepted as the standard designations for the lower zones of continuous and seasonal rainfall, respectively.

While the names of the two lowland zones appear to have been almost universally adopted and their characteristics understood, the same cannot be said of the zones lying above the warm air blanket of the lowlands and yet below the Temperate zones on the higher mountain peaks. At an average elevation of 2,500 feet there occur, on both sides of the continent, pronounced and frequently abrupt changes in the character of the flora and fauna. On the Atlantic slope of the continental divide and on the northern exposures of some of the Pacific coast mountains there is a belt which extends upward

to at least 9,000 feet and differs climatically from the lowlands through the presence of fog, clouds, and decidedly cooler temperatures. On the basis of rainfall this zone comes clearly within the Humid division, but the cooler climate and peculiar flora and fauna at once remove it from the Humid Lower Tropical. This higher, humid belt has, like the two lower zones, been recognized for a number of years, and the distinguishing features of flora and fauna are fairly well known. It is known to occur more or less disconnectedly from Panama to southern Mexico, and in the aggregate covers a large area. However, many of the details of its distribution are still largely a matter of conjecture. A number of peculiar genera, species, and subspecies which occur in this zone are evidently in part indigenous; others are most probably relics of former invasions from South America.¹

It is in connection with this zone in particular that one could wish for some degree of uniformity in the application of a name. "Cloud Forest," "Temperate Rain Forest," "Lower Mountain Forest," "Montane Forest," "Subtropical Zone," and "Humid Upper Tropical Zone" have all been used at one time or another, some of them interchangeably by the same author. The matter of an appropriate name for this zone was discussed with a number of ornithologists of extensive tropical experience, and opinion was divided between Subtropical and Humid Upper Tropical. A serious objection to Subtropical has been that it is likely to be confusing to the average person who is unfamiliar with the situation and to connote a region of accentuated Lower Tropical characters. On the other hand the term Humid Upper Tropical is self-explanatory, and it seems to us should be adopted in preference to any other yet proposed.²

The fourth zonal division, which is characteristic of the Pacific slope but which occurs locally on the Atlantic also, lies on the upper slopes from about 2,500 feet to nearly 9,000 feet, chiefly on the south side of the mountains where the rainfall is seasonal, just as in the Pacific lowlands. This zone is well defined in El Salvador, perhaps more sharply so than any other, and in extent is second only to the Arid Lower Tropical. It is marked by a *silva* of almost pure stands of pines and deciduous, broad-leaved oaks in which parasitic plants

¹ Chapman's *Distribution of Bird-life in Colombia*, 1917 (Bull. Amer. Mus. Nat. Hist., 36), is a work which should be studied carefully by everyone interested, however casually, in the origin and distribution of tropical American life.

² See E. A. Goldman, *Mammals of Panama*, 1920 (Smiths. Misc. Coll., 69, No. 5), and also chapters by the same author in the *Naturalist's Guide to the Americas*, 1926.

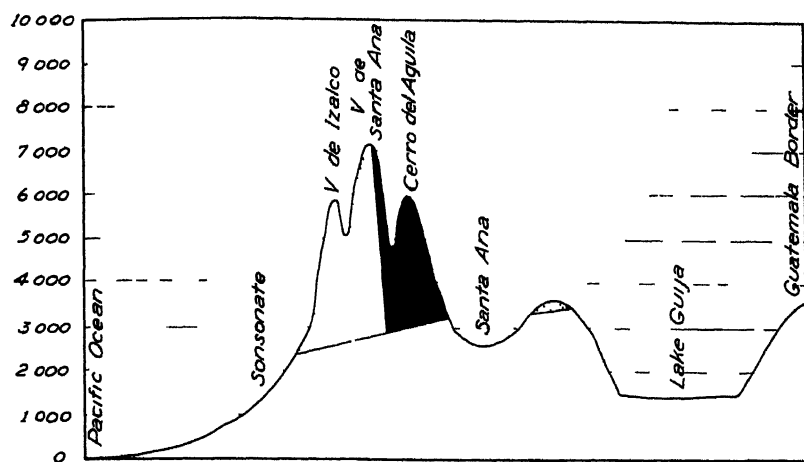


FIG. 1. Vertical distribution of life zones in western El Salvador.

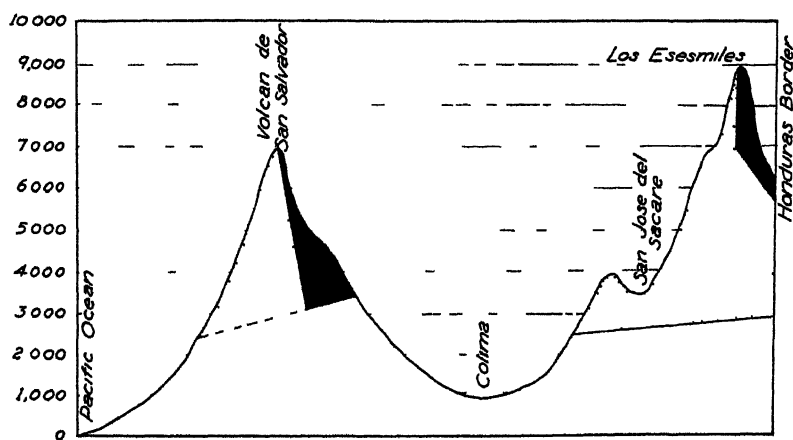


FIG. 5. Vertical distribution of life zones in west-central El Salvador.

and ferns are rare. The aspect is very similar to the lower parts of the Transition Zone in the mountains of southern Arizona, a resemblance which is heightened further by the numerous genera and species of birds common to both regions. E. A. Goldman informs us that there are large areas in western Mexico having just such characters as define this zone in El Salvador, and which he and Dr. E. W. Nelson have long recognized as comprising a well-marked, though as yet undesignated, life belt of the Tropical Region. It is with no desire to anticipate any of Nelson and Goldman's faunal work in Mexico, but through the necessity for having a convenient means of referring to this zone in the body of the report that we suggest the name of Arid Upper Tropical.

The foregoing brief and general outline of the division of the Tropical Region of Central America into four life zones has been given as a background for the more detailed treatment of the Salvadorean part of the picture. Since El Salvador lies wholly on the Pacific slope, no part of its area is within the Humid Lower Tropical Zone. The entire lowlands to an altitude averaging 2,500 feet are typical Arid Lower Tropical; the south slopes of the northwesterly cordillera, of the westerly volcanoes, and practically the entire upper levels of the northeasterly cordillera and the easterly volcanoes are Arid Upper Tropical; and, finally, the north slope and crest of the northwesterly cordillera and the upper north slopes of the westerly volcanoes are Humid Upper Tropical. This last-named zone occurs also, though in very diluted form and mixed with the vastly predominant Arid Upper Tropical, on the crest of the easterly cordillera and on Volcán de San Vicente. (See figs. 3-7.)

The lines of demarcation between zones are usually very abrupt where the character of the vegetation has not been altered radically by removal of the original cover and subsequent intensive cultivation. Practically the entire southwestern foothill belt up to altitudes of 4,000 or 4,500 feet has undergone very pronounced changes, and in consequence it is almost impossible in most places to draw a hard and fast line between the Arid Lower Tropical and either of the upper zones. The eastern departments have suffered far fewer changes, and one usually has no difficulty in determining zone limits. One lamentable exception is the old mining center at Divisadero which, for a radius of many miles, has been stripped of timber and even smaller growth, with the succeeding evils of rapid erosion and soil sterility evident on every hand. This area, together with most of the now cleared land, is supposed originally to have been covered

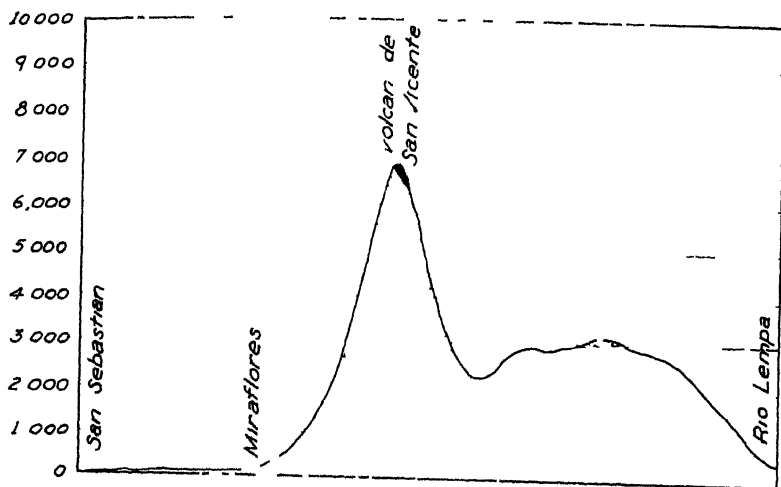


FIG. 6. Vertical distribution of life zones in east-central El Salvador.

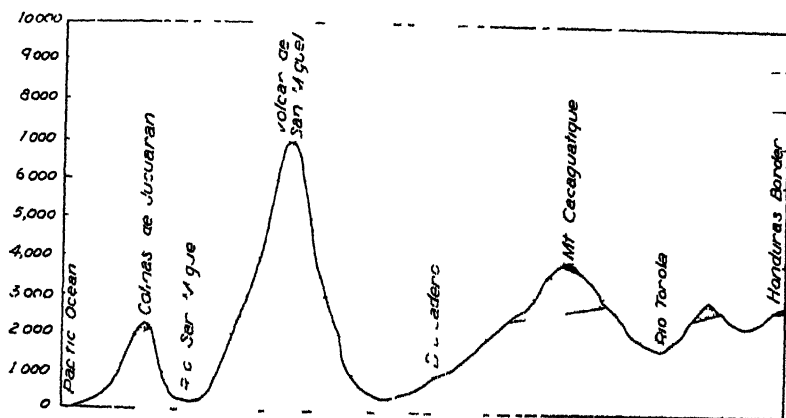


FIG. 7. Vertical distribution of life zones in eastern El Salvador.

with "gallery forest." If one may accept uncleared land in primitive districts as an indication, this was very probably the case.

In El Salvador as elsewhere, zonal changes are more marked on steep slopes than on gentle ones. On the northwestern cordillera and on most of the volcanoes one may step from one zone to another literally within a few yards. On the less steeply graded, eastern cordillera one may encounter definite touches of Humid Upper Tropical mingled with the Arid Upper Tropical and, again, the division between Arid Lower and Humid Upper Tropical may be more or less obscured along the north slopes of the coastal range. On the whole, though, such zonal intermixtures are rare in the more primitive sections of this mountainous republic.

Arid Lower Tropical Zone.—The whole of the lowlands up to elevations varying from 2,000 to 3,500 feet lies wholly within the Arid Lower Tropical Zone (pl. XI). On the Pacific slope of the mountains which lie closest to the coast the maximum altitude attained by this zone rarely exceeds 2,000 feet; on the interior slopes of the coast range it may reach 3,500 feet or even higher, while on the south slope of the cordillera it ceases at an average altitude of 2,500 feet. This variation is probably due in part to the direction of prevailing winds, in part to slope exposure, proximity to the ocean, and other causes, but explicit reasons cannot be advanced until the country has been more thoroughly mapped meteorologically than has so far been done.

The abruptness of the change from one zone to another is normally very pronounced. On the Colinas de Jucuarán, (the low and very old coastal ridge which culminates in the Volcán de Conchagua) the transition from the deciduous forest of the lower zone to the pine-dotted grassland of the Arid Upper Tropical is very sharp indeed and may be taken as typical of zonal delimitation both on the coast and on the interior mountains wherever cultivation has not more or less effectively erased the line. Volcán de San Vicente, Volcán de San Salvador, and Volcán de Santa Ana, particularly on the interior (north) slopes, have undergone such extensive changes, especially below the 5,000 foot contour, that in many places it is virtually impossible to hazard a guess as to the former zonal extent. An average of 3,500 feet is probably close to the correct figure.

The Arid Lower Tropical Zone is remarkable, locally at least, for uniformity of both temperature and relative humidity in spite of the seasonal character of the rainfall. The rainfall, totaling about 74 inches a year, is condensed into the period from April 15

to November 15, and the remaining five months of the year constitute the dry season. The mean annual temperature is approximately 74° F., and the mean annual humidity is 75° F. There is slightly greater humidity and rainfall along the coast and, on the other hand, the interior is slightly more arid. However, these are relatively slight variations and, so far as can be determined now, they act in no way as climatic barriers to the general distribution of lowland species. However, it does not follow that all of the bird species characteristic of this zone are distributed everywhere throughout its length and breadth. While there are a few which have pried their way into almost every conceivable ecologic niche and which, literally, are to be found almost everywhere, the vast majority are firmly bound either by specialization or preference to special plant communities or, to use the generally accepted term, associations. To enumerate all of these is not necessary, but reference may be made to several of the more outstanding general types. Three general categories cover most of the associations in the Arid Lower Tropical: the *Mangrove*, the *Arid Deciduous Forest*, and the *Savanna*. Of the last two, several subdivisions might be recognized, and there are frequently intermixtures with tendencies leaning to one or the other type, so that as a rule the divisions are not clean-cut.

Along the coast back of the narrow strip of sand beach the *Mangrove* association prevails practically to the exclusion of all others except in the few places where the foothills reach the sea (pls. V and XXI). It consists of practically pure stands of *Rhizophora*, *Avicennia*, and *Laguncularia* and, while absolutely dominant as far inland as the high-tide mark, it is limited in area as compared with the others. The *Arid Deciduous Forest*, so characteristic of this zone, occupies, where not removed as a result of human settlement, most of the remaining portions, but it varies exceedingly in luxuriance of growth and in deciduous qualities. On the coastal plain— the low-lying strip which varies in width from the actual littoral to several miles— this forest attains its best development. Here, where generally swampy conditions prevail and where there is a relative abundance of surface water, many trees reach their greatest size and densest growth. Among these are *Cecropia*, *Ceiba*, *Castillia*, *Chlorophora*, *Enterolobium*, many species of *Ficus*, and palms, particularly *Bactris subglobosa*. Although forest of this character ceases as a rule at the first escarpment of foothills at some 300 feet elevation, occasional inland localities may attain a closely similar appearance because of the presence of swamps in landlocked

basins. Hacienda Zapotitán at an altitude of 1,800 feet may be cited as typical of the interior type of swamp forest.

As one enters the broken, rolling, foothill belt, which is geologically a series of lava flows covered to varying depths by pumice and volcanic ash, surface water becomes less evident and is present chiefly in the form of occasional lava-bordered lakes, a few rivers, and innumerable small streams. The trees become smaller, more scattered, and more definitely deciduous, and here and there are areas of the grass-covered Savanna association. Although a large proportion of the species of trees found in the swamp forest extend upward to the limits of the lower zone, these become intermixed with several species of *Mimosa*, *Acacia*, and familiar mesquite (*Prosopis*) of more northern deserts, and similar shrublike, thorny growth. Generally speaking, the largest growth in the foothill belt is along streams and brooks while the intervening mesas and hills tend to support "gallery forest" or a mixture of this and *Savanna*. In certain well-drained, semisterile areas the tree growth consists mostly of a low "gallery forest" of *Crescentia* and *Calycophyllum*, with but little grass or other ground cover. Finally, as one reaches the extreme upward limits of the zone, there is a recrudescence of taller and more typical deciduous forest, particularly along the contact with the upper zones.

Since the departure from primitive conditions in the lowlands and lower foothill belt has been in the direction of denudation or removal of the original forest cover, it follows that Savanna associations now occupy, in the aggregate, a much larger area than formerly. The ranges of exclusively forest-dwelling species have doubtless undergone local restrictions, while those of species requiring or preferring grasslands and scrub have correspondingly increased, so that there is at the present day a species balance different from that which formerly prevailed. However, we believe it to be extremely improbable that human occupation of the area within the Arid Lower Tropical Zone of El Salvador has caused the extinction of any species of birds other than in the most local, one might say "neighborhood" sense.

Of the 446 species and subspecies of birds known to occur in El Salvador, 161 residents or breeding summer visitants are confined rather rigidly to the Arid Lower Tropical and may be said, therefore, to be characteristic of that zone. These are as follows:

<i>Crypturellus cinnamomeus cinnamomeus</i>	<i>Podilymbus podiceps antillarum</i>
<i>Crypturellus cinnamomeus goldmani</i>	<i>Pelecanus occidentalis occidentalis</i>
<i>Colymbus dominicus brachypterus</i>	<i>Phalacrocorax olivaceus mexicanus</i>

- Anhinga anhinga*
Fregata magnificens rothschildi
Casmerodius albus egretta
Leucophoyx thula thula
Hydranassa tricolor ruficollis
Florida caerulea caerulescens
Butorides virescens maculatus
Nycticorax nycticorax hoactli
Nyctanassa violacea bancrofti
Heterocnus cabanisi
Ixobrychus exilis exilis
Cochlearius cochlearius zeledoni
Mycteria americana
Guara alba
Ajaia ajaja
Dendrocygna autumnalis autumnalis
Cairina moschata
Sarcoramphus papa
Odontriorechis palliatus
Ictinia plumbea
Parabuteo unicinctus harrisi
Buteo magnirostris direptor
Buteo plagiatus micrus
Hypomorphnus urubitinga ridgwayi
Buteogallus anthracinus subtilis
Busarellus nigricollis nigricollis
Geranospiza nigra nigra
Herpetotheres cachinnans chapmani
Micrastur semitorquatus naso
Falco albicularis
Ortalis leucogastra
Penelope purpurascens purpurascens
Craz rubra rubra
Colinus leucopogon leucopogon
Colinus leucopogon hypoleucus
Aramus scolopaceus dolosus
Aramides albiventris vanrossemi
Porzana flaviventer woodi
Laterallus ruber ruberrimus
Porphyryla martinica
Jacana spinosa spinosa
Burhinus bistriatus vigilans
Columbigallina passerina pallescens
Columbigallina rufipennis rufipennis
Columbigallina minuta interrupta
Clavaria pretiosa pretiosa
Leptotila verreauxi bangsi
Ara macao
Aratinga canicularis canicularis
Brotogetis jugularis chrysopogon
Amazona albifrons nana
Amazona auropalliata
Coccyzus minor palloris
Piaya cayana stirtoni
Tapera naevia excellens
Dromococcyx phasianellus rufigularis
Morococcyx erythropygus erythropygus
Crotophaga sulcirostris sulcirostris
Tyto alba guatemalae
Otus choliba cooperi
Glaucidium brasilianum ridgwayi
Ciccaba nigrolineata nigrolineata
Pulsatrix perspicillata saturata
Nyctibius griseus mexicanus
Chlorostilbon canivetii osberti
Anthracothorax prevostii prevostii
Anthracothorax prevostii gracilirostris
Saucerotia devillei
Saucerotia cyanura cyanura
Amazilia rutila rutila
Amazilia rutila corallirostris
Hylocharis eliciae
Anthoscenus constantii constantii
Anthoscenus longirostris pallidiceps
Trogon violaceus sallaei
Trogon melanocephalus melanocephalus
Trogon elegans elegans
Megaceryle torquata torquata
Chloroceryle amazona
Chloroceryle americana septentrionalis
Chloroceryle aenea stictoptera
Eumomota superciliosa apiaster
Notharchus hyperhynchus cryptoleucus
Pteroglossus torquatus torquatus
Ceophloeus lineatus similis
Centurus aurifrons santacruzi
Veniliornis fumigatus sanguinolentus
Phloeocastus guatemalensis guatemalensis
Dendrocolaptes certhia sancti-thomae
Xiphorhynchus flavigaster flavigaster
Lepidocolaptes souleyetii insignis
Sittasomus griseicapillus sylvioides
Synallaxis erythrothorax pacifica
Thamnophilus doliatus intermedius
Thamnophilus doliatus pacificus
Chiroxiphia linearis fastuosa
Attila spadiceus salvadorensis
Platypsaris aglaiae latirostris
Platypsaris aglaiae sumichrasti
Tityra semifasciata personata
Sayornis nigricans aquatica
Tyrannus melancholicus chloronotus
Myiodynastes luteiventris luteiventris
Megarynchus pitangua mexicanus
Myiozetetes similis superciliosus
Myiarchus cinerascens flavidior
Myiarchus tyrannulus brachyurus
Myiochanes cinereus rhizophora
Onychorhynchus mexicanus mexicanus
Onychorhynchus mexicanus fraterculus
Platyrinchus cancrominus

<i>Tolmomyias sulphureus cinereiceps</i>	<i>Cyclarhis flaviventris nicaraguae</i>
<i>Todirostrum cinereum finitimum</i>	<i>Dendroica erithachorides xanthotera</i>
<i>Oncostoma cinereigulare</i>	<i>Euthlypis lachrymosa</i>
<i>Elaenia flavogaster subpagana</i>	<i>Basileuterus delatitri delatitri</i>
<i>Elaenia viridicata placens</i>	<i>Agelaius phoeniceus grinnelli</i>
<i>Camptostoma imberbe imberbe</i>	<i>Icterus pectoralis pectoralis</i>
<i>Tyranniscus vilissimus vilissimus</i>	<i>Icterus sclateri sclateri</i>
<i>Mionectes oleagineus obscurus</i>	<i>Icterus sclateri alticola</i>
<i>Progne chalybea chalybea</i>	<i>Icterus gularis gularis</i>
<i>Iridoprocne albilinea</i>	<i>Tangavicus aeneus aeneus</i>
<i>Calocitta formosa pompatia</i>	<i>Amblycercus holosericeus holosericeus</i>
<i>Thryothorus pleurostictus oblitus</i>	<i>Tanagra affinis</i>
<i>Thryothorus pleurostictus lateralis</i>	<i>Thraupis abbas</i>
<i>Thryothorus maculipictus varians</i>	<i>Thraupis cana diaconus</i>
<i>Heleodytes rufinucha capistratus</i>	<i>Habia salvinii welmorei</i>
<i>Poliophtila bilineata bairdi</i>	<i>Saltator atriceps atriceps</i>
<i>Ramphocaelus rufiventris rufiventris</i>	<i>Saltator grandis hesperis</i>
<i>Vireo olivaceus flavoviridis</i>	<i>Aimophila ruficauda ruficauda</i>
<i>Vireo pallens pallens</i>	<i>Cyanococcyz parrillina dearborni</i>
<i>Vireo pallens ochraceus</i>	<i>Guiraca caerulea lazula</i>
<i>Hylophilus decurtatus pallidus</i>	<i>Sporophila moreletii mutanda</i>
<i>Cyclarhis flaviventris flaviventris</i>	<i>Sporophila minuta parva</i>

Arid Upper Tropical Zone.—The Arid Upper Tropical which occupies, locally, the higher levels not taken up by the Humid Upper Tropical is, in Central America, chiefly a Pacific zone since it possesses a well-defined dry season extending from November to May (pls. VII, VIII, and XI). However, average temperatures are decidedly lower than in the Arid Lower Tropical and the relative humidity, at least during the dry season, is unquestionably below that of the lowlands.

Locally the Arid Upper Tropical is more generally distributed than the Humid division, and it also occupies in the aggregate a decidedly larger area. The lowest level at which it was encountered was 2,000 feet, at which level there are well-defined patches along the crest of the Colinas de Jucuarán and on the south slope of Volcán de Conchagua. In localities not directly on the seacoast it does not become evident until slightly higher elevations are reached. On Volcán de San Miguel (pl. XI) it begins abruptly at 2,700 feet and on major mountains elsewhere at about 2,500 feet. There are small areas between Volcán de Santa Ana and Lake Guija and also between Volcán de San Vicente and the Honduras border which do not produce this zone short of the 3,500 feet contour, but these are relatively low hills which are dominated by the surrounding lowlands. Above these levels, which average about 2,500 feet, the zone extends to the summits of all mountains on which it occurs. On Los Esesmites it was found in typical form

up to nearly 9,000 feet. In the western departments it is characteristic of the south slopes, but eastward from Volcán de San Vicente the entire upper levels regardless of slope are included.

Under natural conditions the lines of contact between this zone and the Arid Lower Tropical are normally clean-cut; the same is true of the juncture of Arid and Humid Upper Tropical, though occasionally an intermixture occurs which involves both flora and fauna. However, since the coffee belt stretches along the foothills between about 2,200 and 5,000 feet and even to lower than 2,000 feet on the Balsam Range, the boundaries in closely settled districts have been largely obliterated.

The three associations which form the most outstanding divisions of the Arid Upper Tropical are the *Pine*, consisting of stands of the widespread *Pinus oöcarpa*; the *Oak*, of at least two, broad-leaved, deciduous species of *Quercus* the exact identity of which is unknown, and finally what may be termed *Upland Savanna*. This last is more or less rocky and broken mesa covered with a variety of short grasses and dotted with *Agave* and low, dense shrubs among which the waxberry (*Myrica mexicana*) may be mentioned as typical. All three of these associations may occur in a locality or, again, there may be two or even one only. On the Colinas de Jucuarán and Volcán de Conchagua oaks are apparently absent, and there one finds rock-strewn grasslands on which are scattered individual trees and solid clumps of pines. Volcán de San Miguel, on the contrary, has no pines, and the associations to be found there are groves of oaks alternating with lava grasslands. Almost the entire north slope of this mountain has been appropriated for coffee culture, but the original silva consisted chiefly if not entirely of oaks and, to judge by the few remaining uncut areas, was very similar to other parts of the mountain where conditions are still primitive. Pines are also absent from the extreme summit of Volcán de Santa Ana, though they occur in fair numbers on the middle slopes not occupied by the cloud forest. The whole of the upper 200 feet on this mountain is a rolling, grassy prairie, dotted with oaks, agave, and patches of thorny scrub. On the volcanoes of San Salvador, Santa Ana, and all along the interior cordillera, all three of the associations mentioned occur in varying proportion, and bird life of the Arid Upper Tropical in those localities is consequently more varied than in localities where one or more associations are absent.

The greatest stretches of this zone are to be found along the southern slopes of the interior mountains and there one may walk for

hours, or for days for that matter, through semimountainous country covered with groves of pines and oaks which alternate with open grassland. The aspect is startlingly similar to that frequently encountered in the lower Transition Zone in the mountains of southern Arizona; on meeting with such birds as zone-tailed hawks, painted quail, band-tailed pigeons, flickers, acorn woodpeckers, bluebirds, olive warblers, hepatic tanagers, chipping sparrows, siskins, and other familiar forms it takes but little imagination to fancy one's self in northern latitudes.

The relationships of the great majority of the birds characterizing the Arid Upper Tropical so obviously lie in the direction of the Mexican tableland and not to the south that argument is unnecessary. The 51 species and subspecies which are definitely assignable to this zone are as follows:

Accipiter erythronemius chionogaster
Buteo jamaicensis costaricensis
Buteo albonotatus
Dactylortyx thoracicus salvadoranus
Dactylortyx thoracicus taylori
Cyrtonyx ocellatus differens
Dendroortyx leucophrys nicaraguae
Columba fasciata letonai
Aratinga rubritorquis
Geococcyx velox affinis
Otus trichopsis mesamericanus
Aeronautus saxatalis nigrior
Doricha enicura
Aithya heloisa ellioti
Eugenes fulgens
Amazilia cyanocephalus guatemalensis
Trogon collaris puella
Aulacorhynchus prasinus volcanius
Colaptes mexicanoides pinicolus
Balanophyia formicivora lineata
Xiphocolaptes promeropirhynchus emigrans
Pachyramphus major australis
Myiochanes pertinax minor
Empidonax fulvifrons inexpectatus
Mitrephanes phaeocercus quercinus

Elaenia obscura frantzii
Cissilopha melanocyanea melanocyanea
Cissilopha melanocyanea chavezii
Corvus corax sinuatus
Salpinctes obsoletus guttatus
Melanotis hypoleucus
Turdus rufiglorus
Catharus aurantiirostris wortheni
Catharus aurantiirostris bangsi
Sialia sialis meridionalis
Vireo solitarius montanus
Peucedramus olivaceus micrus
Dendroica graciae decora
Setophaga picta guatemalae
Icterus sclateri pustuloides
Icterus chrysater chrysater
Icterus wagleri wagleri
Piranga flava albifacies
Piranga bidentata sanguinolenta
Melospiza occipitalis
Zonotrichia capensis costaricensis
Spizella passerina cicada
Aimophila rufescens pectoralis
Tiaris olivacea pusilla
Spinus notatus olivaceus
Spinus psaltria croceus

Humid Upper Tropical Zone.—The Humid Upper Tropical is marked not only by relatively cool temperatures, but by a yearly precipitation in the form of condensing fog in addition to frequent rains. In this latter respect it differs vitally from the Arid Lower and Arid Upper Tropical Zones, both of which have a dry season of some five or six months' duration. As a matter of fact the Humid Upper Tropical is, so far as Central America is concerned, an Atlantic

slope zone which occurs locally and irregularly on the Pacific side just as the Arid Upper Tropical is essentially a Pacific zone which may occur locally on the Atlantic.

Though the southward moving trade winds which blow from November to May drop the greater part of their cargo of moisture on the Atlantic side of the continent and contribute little or no rain to the Pacific lowlands, they retain enough humidity to produce a more or less pronounced precipitation when they strike the northward-facing, upper levels of the local spurs of the cordillera and the isolated peaks of the volcanic coastal range. The northern slopes of both these mountain systems are thus subjected the year through to a humid climate. Not only do they receive the 73 inches of rain which falls during the Pacific rainy season, but during the dry season they derive additional moisture from more or less frequent rains and from dense, driving fog which saturates foliage and soil alike. The total annual precipitation certainly exceeds 100 inches and probably reaches 150 inches under favorable conditions. It is, therefore, not in the least surprising that on these cool, humid, northern slopes there exists a flora and fauna very different from that of either the hot, semiarid lowlands or the semiarid south slopes of the same mountains.

The Humid Upper Tropical is best developed, in El Salvador, along the high, northwestern, interior mountains which are integral parts of the great Honduran cordillera (pls. IX, X, XIX, and XXII). The northeastern, interior mountains, though they belong to the same system, do not attain sufficient altitude to produce any great amount of condensation, and the Humid Upper Tropical occurs only in very dilute form. Along the volcanic coastal chain there is also great local variation, even though the four major peaks attain a very uniform height. This zone is very well marked on Volcán de Santa Ana, less so on Volcán de San Salvador, is present on Volcán de San Vicente only as a small area near the summit, and is seemingly absent altogether on Volcán de San Miguel. A glance at the life zone map (fig. 3) will at once show the westerly accentuation of the Humid Tropical in El Salvador. The causes of local variation seem evident enough in the case of the interior mountains, for the northeasterly cordilleran spurs plainly have not sufficient altitude to produce this zone. Why it should become progressively less pronounced as one goes east along the coast range is not so obvious. San Miguel and San Vicente rise abruptly from the coastal plain, while San Salvador and Santa Ana are culminating points in broken hill country,

the average level of which is some 2,000 feet higher than the bases from which arise San Miguel and San Vicente. While this possibly contributes to the presence or absence of the Humid Upper Tropical on these four evenly spaced and more or less isolated peaks, it must be remembered that the upper limits of the Arid Lower Tropical are little, if any, higher on the eastern volcanoes than on the western ones. We believe the chief reason to be the location of the mountain masses in the interior of Honduras, where the trade winds are probably more effectively drained of moisture at a point north of eastern El Salvador than in the lower mountains to the north of western El Salvador. At any rate, and from whatever cause, Volcán de San Salvador marks the easternmost extension of this zone in well-developed form on the coastal range.

The evidence from Mt. Cacaguatique indicates that the lower limits of the Humid Upper Tropical are about 3,700 feet in the interior mountains, from which level the zone occupies most of the north slopes of the range to the summit of Los Esesmiles, which is a trifle over 9,000 feet. On the north slope of the coast range it is difficult, in most places, to determine the exact lower limits for it is there that intensive cultivation has destroyed most of the original woodland. For instance, on the north slope of Volcán de San Salvador the ground has been stripped of timber up to 4,000 and even to 5,000 feet, and the former forests have been replaced by pastures, cornfields, and coffee groves. Large numbers of lower zone plants have worked their way upward or have been introduced, and a vertical extension of lowland birds and animals has followed the plants.

Under conditions such as these one may consider himself fortunate to discover in some isolated ravine a spot of untouched growth which will indicate the zonal boundaries. From what evidence could be gathered, the lower boundary of the Humid Upper Tropical on the western coastal mountains is slightly lower than on the cordillera, and averages between 3,000 and 3,500 feet. From these altitudes it extends to 6,800 feet on the summit of Volcán de San Salvador and to 7,000 feet on Volcán de Santa Ana. While the upper 200 feet on the summit of Santa Ana is, at the present time, definitely Arid Upper Tropical in character, the circumstance is probably due to the destruction of the one-time forest by recurrent volcanic eruptions.

Whereas the two arid zones contain several definable associations, the Humid Upper Tropical consists chiefly of one, the *Cloud*

or *Montane Forest* of most writers (pls. IX, X, XIX, and XXII). This is a dense forest of gigantic, short-needled pines and small-leaved, evergreen oaks and other hardwoods, the trunks and branches of which are frequently so concealed by moss and parasitic plants that often the identity of individual trees may be determined only by the overhead foliage. Tree ferns and begonia-like plants constitute the chief undergrowth, while the ground litter of fallen trees, leaves, and branches is to a large extent concealed by smaller ferns and moss. The luxuriance of growth is naturally dependent on the degree to which the zone is developed, and by no means all spots even in such a locality as Los Esesmites are covered by cloud forest. Land slips, windstorms, and cuttings make greater or smaller openings which rapidly become filled with low bushes and vines, then by sapling forest, and finally by sturdy second growth. Several steps in the reclamation of clearings by forest may be seen in one of the accompanying photographs which were taken on Los Esesmites.

The sharpness of the division between Humid and Arid Upper Tropical is somewhat dependent on steepness of slope, but since both are mountain zones the change is usually abrupt. A hundred feet will sometimes take one from cold, dripping forest which is washed with rain or driving clouds from one year's end to another to warm, sunny, open groves of pine and oak where for six months of the year the skies are normally clear.

Contrary to the Arid Upper Tropical, which is characterized by the presence of many northern, or at least Mexican, forms, the Humid Upper Tropical Zone is notable for species which are either endemic or of South American origin. A few southern extensions of northern species or genera also occur, but for the most part the avifauna is peculiar to Central America, though with many South American affinities.

Forty-five species or subspecies may be considered typical of the Humid Upper Tropical Zone. This relatively small number reflects not only the limited local extent of this zone, but the small number of ecologic niches which it provides. These species are:

Penelopina nigra nigra
Penelopina nigra dickeyi
Oreopeleia albifacies silvestris
Strix fulvescens
Caprimulgus vociferus vermiculatus
Abeillia abeillei abeillei
Lampornis amethystinus salvini

Lampornis viridipallens connectens
Lampornis viridipallens nubivagus
Lamprolaima rhami saturator
Colibri thalassinus
Hylocharis leucotis pygmaea
Pharomachrus mocinno mocinno
Aspatha gularis

Aulacorhynchus prasinus stenorhabdus
Dryobates villosus parvulus
Lepidocolaptes affinis affinis
Grallaria guatemalensis guatemalensis
Empidonax flavescens dwighti
Rynchocyclus brevirostris brevirostris
Cyanocitta stelleri lazula
Aphelocoma unicolor griscomi
Cyanolyca pumilo nigrogularis
Hemicorhina leucophrys capitalis
Troglodytes rufociliatus rufociliatus
Troglodytes rufociliatus nannoides
Turdus assimilis rubicundus
Turdus plebejus rafaensis
Turdus infuscatus
Catharus frantzii juancitonis

Catharus frantzii alticola
Myadestes unicolor veraepacis
Myadestes obscurus oberholseri
Diglossa barbitula montana
Vermivora superciliosa superciliosa
Myioborus miniatus hellmayri
Myioborus miniatus connectens
Basileuterus belli scitulus
Icterus maculi-alatus
Chlorophonia occipitalis
Tanagra elegantissima vincens
Chlorospingus ophthalmicus honduratus
Buarremon brunneinuchus brunneinuchus
Ailapetes gutturalis fuscipygius
Ailapetes gutturalis grisepectus

GEOGRAPHICAL DISTRIBUTION OF THE AVIFAUNA

With regard to the component elements of the Salvadorean avifauna, the general statement may be made that aside from extra-territorial transients and species of general distribution throughout Central America, the bird population consists for the most part of species or subspecies which have their distribution centers in areas outside the boundaries of El Salvador, and whose presence in that country is due to the intrusion of spurs of the various mountain or lowland areas of which they are characteristic. Such being the case it necessarily follows that the avifauna as a whole is heterogeneous. Because of the rarity of completely isolated peaks or lowlands there has been little opportunity for isolation and consequent development of endemic races.

The total number of species and subspecies of birds at present known to occur in El Salvador is 446. Of these, 138 are transients or winter visitants from the north, leaving 308 which may properly be considered to constitute the local avifauna. Of these 308 there are some half dozen which are not permanent residents, since they breed in the country and later migrate southward. However, for present purposes these summer visitors may be considered as residents. Zonally, the 308 residents are distributed as follows: 161 in the Arid Lower Tropical; 51 in the Arid Upper Tropical; 45 in the Humid Upper Tropical; 51 of general distribution or of uncertain zonal status.

El Salvador is not a self-contained geographical entity like an island or a peninsula or a homogeneous mainland area enclosed by natural boundaries. It is a minor sector of the Central American continent with its boundaries arbitrarily dictated by political exigencies and with absolutely no consideration for students of

zoögeography. Within the area enclosed are spurs or intrusions of several well-developed, though as yet imperfectly known, life areas, the greater parts of which lie at some distance outside the boundary.

An initial division of the local bird forms shows four readily apparent groups; (1) those of continent-wide distribution (within the appropriate zones of course); (2) those of general distribution along the west coast of Central America; (3) a group of species

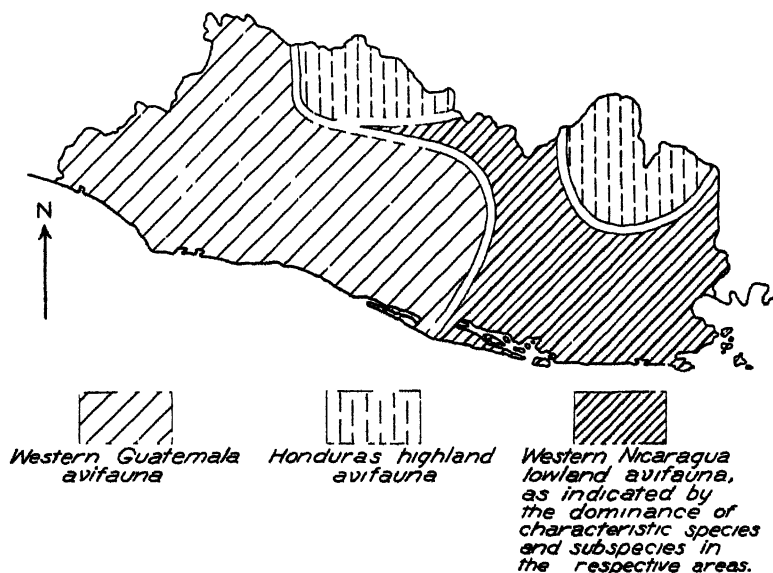


FIG. 8. Areas dominated by species and subspecies which have most probably originated in extralimital centers.

and subspecies which center in extralimital areas and which enter El Salvador on the peripheries of their ranges; and (4) those subspecies which are confined to differentiation centers within the republic.

Except for the last-named group there is no necessity to be specific as to actual numbers, nor is it desirable to be so in the present very sketchy state of our knowledge concerning Central American birds. Species or subspecies of supposedly wide distribution are broken up into races as data and material accumulate and, conversely, supposedly distinct forms occasionally show a disconcerting tendency to become indistinguishable when age, sex, and seasonal characters become understood.

The approximate proportion of the four indicated groups to the resident population as a whole may be stated as:

	Per cent
General Central American distribution.....	50
General west coast distribution ..	25
Radiates from extralimital centers	21
Locally developed or segregated races	4

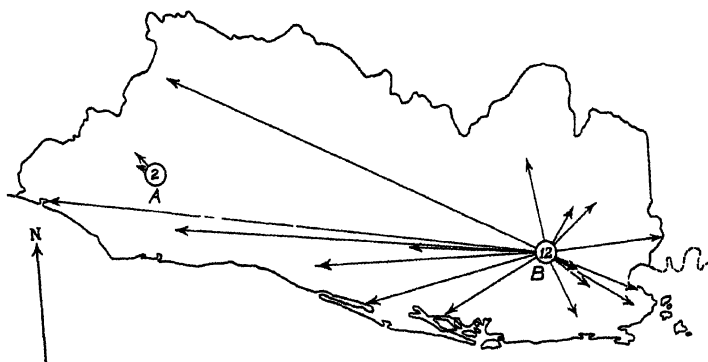
In the third group four extralimital faunal areas are represented (fig. 8). The western Guatemalan avifauna (perhaps from two different centers) extends east and north to the Lempa River; several western Nicaraguan lowland forms occupy the southeastern coastal plain and extend up the Lempa Valley; the interior mountains east of the Lempa are faunal as well as geological outposts of the great Honduran mountain system, while finally there is a distinct infusion of north (Atlantic) coast races which have spread generally over the lowlands. There are excellent reasons for believing this invasion to have come from the northeast, via the relatively low ground between the Rio Motagua Valley and Lake Guija. This is almost certainly the case with three races and is strongly indicated in others.

While the sections as they have been drawn are dominated by races representative of the several extralimital faunal areas, they have, of course, no sharp and well-defined boundaries such as it is necessary to give them on the map. Occasional Nicaraguan forms extend clear across El Salvador to the Guatemalan border, and Guatemalan birds penetrate for varying distances into territory marked as "Nicaraguan" or "Honduran," so that there is more or less interdigitation or overflow from one area into another. The line is therefore a rather arbitrary one, based on a balance of the ranges of many subspecies, and is probably as correctly placed as any line under such circumstances ever can be.

In limiting the differentiation centers of El Salvador to two we have been unduly influenced, perhaps, by physiographical considerations and have anticipated geographical behavior in the cases of several races. Los Esesmites and Mt. Cacaguatique are so obviously Honduran that we have always considered the several "new" races discovered there to be Honduran, not Salvadorean. The faunal identity of these two outposts with the cordillera of Honduras is now partly established through several races and we have little doubt that all of the remaining forms, at present known only from the mountains of interior El Salvador, will be found to center in Honduras. Similarly, there are two or three races known

only from southwestern El Salvador whose ranges coincide so closely with the local extensions of Guatemalan birds that they are in all probability radiates from a Guatemalan center.

The two differentiation districts which appear to be of Salvadorean origin are the Santa Ana District centering on Volcán de Santa Ana, and the San Miguel District centering on Volcán de San Miguel (fig. 9). The first is poorly characterized and contains but two endemic races. Volcán de Santa Ana probably has never been isolated completely, and consequently there has been no effective segregation either of the Arid Lower or the Arid Upper Tropical



A. Santa Ana Faunal District
B. San Miguel Faunal District

FIG. 9. Limits of radiation of the two races characterizing the Santa Ana Faunal District and of the twelve characterizing the San Miguel Faunal District.

inhabitants. As a whole the region is dominated by Guatemalan forms which, because of the high average level of the surrounding country, find no effective barrier to passage into or out of the locality. The Humid Upper Tropical birds are also, for the most part, identical with Guatemalan coastal mountain races, but this zone is, unlike the other two, a completely isolated environment. That it has been so for a long period is attested by two of the cloud-forest birds there, a wren and a hummingbird, which have become recognizably darker and duller colored than their species representatives in other areas. The two birds characteristic of the Santa Ana Faunal Area are:

Lampornis viridipallens nubivagus *Troglodytes rufociliatus nanoides*

The second, and more important, differentiation district centers about Volcán de San Miguel. This rises directly from a coastal plain which bears evidence of having but recently been elevated,

and there can scarcely be a question that it was completely surrounded by water at no very distant date.

Five subspecies of birds are endemic in the Arid Upper Tropical Zone on this mountain, though one of them is found also on the closely adjacent Volcán de Conchagua, which together with the ridge of the Colinas de Jucuarán, was necessarily isolated also. Whether the one bird, the rock wren, was developed on both former islands or has since passed from one to the other is immaterial. In addition to the five higher zone birds which unquestionably are endemic, there are at least seven Arid Lower Tropical subspecies the ranges of which center about Volcán de Miguel. They range at the present time to various distances from this center, but apparently never farther than southwestern El Salvador on the west and to southern Honduras or extreme northwestern Nicaragua in the opposite direction. Except for these seven characteristic subspecies the lowlands surrounding Volcán de San Miguel are occupied by races which are either typically west-Nicaraguan or of general west coast distribution, and which must necessarily have entered the region since the elevation of the coastal plain.

The five birds which are peculiar to the Arid Upper Tropical Zone of the Volcán de San Miguel Faunal Area are:

<i>Dactylortyx thoracicus salvadoranus</i>	<i>Salpinctes obsoletus guttatus</i>
<i>Aulacorhynchus prasinus volcanus</i>	<i>Icterus sclateri pustuloides</i>
<i>Aimophila rufescens pectoralis</i>	

The seven Arid Lower Tropical Zone birds which are characteristic of the adjacent lowlands are:

<i>Colinus leucopogon leucopogon</i>	<i>Hylophilus decurtatus pallidus</i>
<i>Notharchus hyperrhynchus cryptoleucus</i>	<i>Thryothorus pleurostictus lateralis</i>
<i>Attila spadiceus salvadorensis</i>	<i>Agelaius phoeniceus grinnelli</i>
<i>Habia salvinii wetmorei</i>	

METHOD OF TREATMENT

In preparing the general account of each species, a uniform method of treatment has been followed with the data grouped under subheadings. The sequence is as follows.

Citation.—The scientific name, supplemented by the English vernacular and also the native vernacular if known. It should be realized that often a single native name covers several or many species, and in such cases it is not always given. For example, "Guarda Barranca," although a widely used name, varies to such an extent in its application as to be useless for practical purposes. In localities only a few miles apart it may mean a solitaire,

a motmot, a manakin, or in fact, almost anything. Many species, however, particularly the larger or more striking ones, are widely known under a characteristic name, and when such is the case the native name, the only real vernacular, follows the purely synthetic English one.

The citation of the original description, which in all cases where possible has been checked to the publication where it appeared; then follow the specific references of occurrence in El Salvador. Whenever reference is made to ornithological or other papers that are not cited in the species bibliography, their titles appear as footnotes. Experience has shown this method to be preferable to the usual custom of lumping the bibliographical material at the end of the work.

Specimens and records.—The actual number of specimens from El Salvador examined, together with the dates of collection, except in the cases of the more abundant residents, is given. In the same paragraph, also, is a list of localities and dates where the species was observed, but not collected, and a list of the localities from which it has been recorded in literature. All El Salvador specimens cited are in the Dickey collection at the California Institute of Technology, except a limited number which are in the collection of Dr. Loye Miller at the University of California at Los Angeles.

Status.—A condensed summary of the manner of occurrence of the species within the boundaries of El Salvador.

Remarks.— This includes first a discussion of the systematic status of the form involved or comment on characters shown by the locally taken specimens; then a general summary of notebook and personal observations on the general habits.

Nesting. Under this head is incorporated all that is known as to the breeding activities within El Salvador limits, or of the probable nesting season as indicated by the dissection of specimens in the many instances where no nests were found.

Plumage notes.— This consists of such data on molts or plumage sequences as have been apparent in the prepared skins or in the field, but no attempt has been made to go into the subject exhaustively. It is very easy to go far astray on molt programs when generalizations are based on a limited number of specimens, and in most cases the actual number of skins on which statements are based is specified.

Colors of soft parts.—These were recorded in the field, at the latest within a very few hours after death. They are included in the hope that they will prove of value not only to the systematic worker, but also to anyone having occasion to depict the species.

Stomach contents.—The contents of the stomachs of such individuals as were examined have been listed in order to indicate in a general way something of the food habits of the species.

ANNOTATED LIST OF SPECIES

Order TINAMIFORMES. Tinamous

Family TINAMIDAE. Tinamous

Crypturellus cinnamomeus cinnamomeus (Lesson). LESSON'S TINAMOU, GALLINA DE MONTE.

Tinamus (nothura) cinnamomea Lesson, Rev. Zool., 5, p. 210, July, 1842—La Unión, Centre Amérique (=El Salvador).

Crypturellus cinnamomeus cinnamomeus Conover, Proc. Biol. Soc. Wash., 46, p. 113, June 30, 1933, part (localities listed below; crit.); Griscom, Ibis, p. 542, July, 1935—(Salvador; crit.).

Crypturornis cinnamomeus cinnamomeus Bangs and Peters, Bull. Mus. Comp. Zool., 67, p. 471, January, 1927—part, Salvador.

Crypturus cinnamomeus Salvadori, Cat. Birds Brit. Mus., 27, p. 541, 1895—part, La Unión;—Salvin and Godman, Biol. Cent.-Amer., Aves, 3, p. 455, 1904—part, La Unión.

Tinamus cinnamomeus Sclater and Salvin, Ibis, p. 226, 1859—part, La Unión.

Specimens and records.—Volcán de Conchagua, 4; Lake Olo-mega, 4; Colinas de Jucuarán, 1; Rio San Miguel, 4; Colima, 1. Recorded from La Unión.

Status.—Common resident of the Arid Lower Tropical Zone from the extreme southeastern part of the republic north and west in the Valley of the Lempa River at least as far as Colima. The vertical range is from sea level to about 3,300 feet (fig. 10).

Remarks.—By reference to the map, it will be seen that the typical race, *cinnamomeus*, is confined to a relatively restricted area and that by far the greater part of El Salvador is occupied by the paler subspecies, *goldmani*. As the two forms differ not at all in general habits, the following paragraphs are a condensation of the field notes covering both.

These small tinamous are better and more generally known than any other native game birds for, although nowhere abundant, they are distributed throughout the Arid Lower Tropical Zone, and one

or more birds are almost sure to be encountered during a morning's walk in wooded or semiwooded country (pl. XVIII). A favorite habitat is well-grown, second growth woods along the lower foothills, in places where the foliage of the forest crown is not too dense to permit a fairly thick undergrowth with the resulting leaf mulch. In such a place during the dry season, by walking quietly along an old woods road or trail one can often encounter an occasional tinamou in the act of working over the litter of dead leaves and mold. Unless surprised too suddenly it will attempt to steal away when the soft rustling of dead leaves enables one quickly to locate it. With the first rains the ground cover becomes a soggy mass which gives forth little or no sound, and tinamou hunting then becomes a very uncertain game. In the wet season one's introduction to these birds is likely to be a feathered explosion

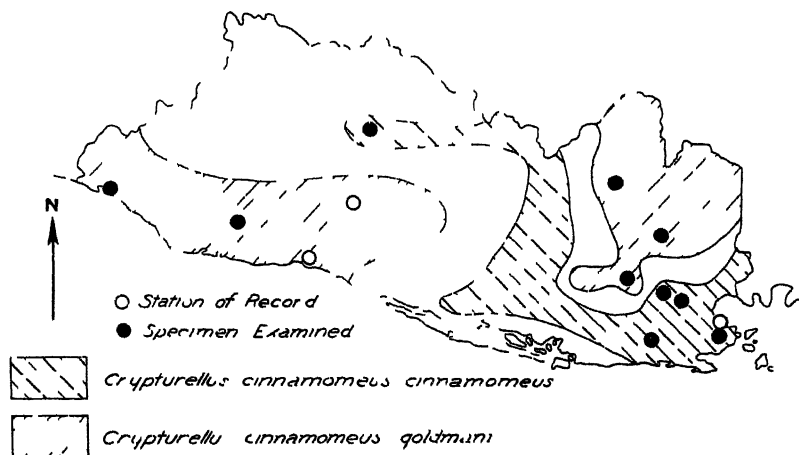


FIG. 10. Distribution of two races of the tinamou, *Crypturellus cinnamomeus*, in El Salvador.

which bursts with a roar from under foot, affording a brief glimpse of a brownish rocket that disappears behind the nearest foliage. Once tinamous are flushed it is useless to follow them, for immediately upon alighting they race away through the thick underbrush. Repeated observations showed that if surprised suddenly the birds squat and hide and do not flush until almost stepped on, but that if there is ample warning they will attempt to slip quietly away.

The times of greatest activity are dawn and dusk when the woods in favored localities are filled with their plaintive, monotone whistles. There are two distinct types of notes, and the native hunters insist that one is the call-note of the male and the other

that of the female. Unfortunately there was considerable disagreement as to which sex gave the lower note and which the higher, nor was the question ever settled by personal observation. Either whistle is easily imitated and will usually be answered at once, but none of us ever succeeded in calling an answering bird into range. At close range there is a distinct trilling quality to the call, and in all probability the birds become aware of attempted imitations after a few repetitions. There is evidently a certain amount of after-dark activity of tinamous, also, for our native hunter, José María Morales, once brought in a half-grown youngster that he had caught by the aid of a hunting lamp as the bird wandered about through the woods.

Perhaps the two most outstanding characteristics which one soon learns to associate with *Crypturellus cinnamomeus* are its solitariness at all times and the fixed routine of its daily life. If a tinamou is found walking along a trail at dawn, or hunting through the leafy ground cover beneath a certain tree, or dust bathing in the road at dusk, it is pretty certain that on the next and succeeding days it will be at the same place at the same time. This routine, however, has in no way handicapped the ability of the species to adapt itself to changed or changing conditions. In the hill country the birds take as readily to the coffee groves as to the original underbrush. Near Divisadero, where practically all original growth has been destroyed, they seemed to be perfectly at home in the new covering of mimosa scrub which bordered the numerous little water-courses. The one habitat requisite seems to be a low, protective growth. Possibly because of the lack of this type of cover tinamous were absent from the great forest bordering the coast near Puerto del Triunfo and the mouth of the Lempa River, an absence at first attributed to the excessive dampness of the forest floor. Later they were found to be common at Barra de Santiago, another sea-coast locality which was equally boggy and humid, but with a lower, thinner forest which possessed the all-important ground cover.

Prepared skins fail utterly to convey an idea of the appearance of the living birds, which in proportions and carriage resemble nothing so much as miniature guinea fowl. The flesh is oddly transparent, so much so that small blood vessels can be seen beneath the surface, and it is of a most unappetizing bluish hue. It becomes dead white when cooked and is, except in young birds, rather dry and tasteless.

Nesting.—A broken-up nest together with the remains of the brooding parent was found at Lake Olomega on August 1, 1925. The scratched-out hollow was under a pile of cut brush thrown carelessly in a well-traveled trail, and on several previous days we had jumped over the pile without flushing the brooding bird or being aware of the hidden nest. On the morning in question the numerous scattered feathers which focused in the the brush heap quickly disclosed the site. In the hollow were the remains of several eggs, apparently four or five, with shells a highly glossed light purplish red. Whether the feathers of the brooding bird had belonged to a male or a female could not be determined.

It is obvious that the nesting habits of the various species of *Crypturellus* vary a good deal. The closely allied *C. variegatus* of British Guiana seems to be polyandrous, the females laying one egg for each of several males,¹ while *C. soui* of Costa Rica has been found to lay two eggs.

The laying season in El Salvador extends, judging from the dissection of females, from early April to early August, with the peak of production probably about halfway between these dates. Half-grown young were collected or seen several times in mid-August. They were solitary even at this early age. The young reach their full growth very slowly and are several months old before attaining their maximum weight.

Plumage notes.—No young in either the downy or pure juvenal stages were collected. The juvenal plumage is worn for a relatively brief time, for two half-grown young, taken on August 18 and 19, 1925, were rapidly assuming the first winter dress. The innermost secondaries (tertials) are retained through the winter and well into the following spring and thus afford positive evidence of age in specimens taken in winter.

Colors of soft parts.—Adults: tarsi and feet, "Light coral red"² or "Carnelian red"; claws, white or light cream color; iris, grayish olive or hazel; maxilla, dull black; mandible, orange flesh with tomia dusky. Half-grown young are similar to adults, but the tarsi and feet are tinged with dusky and the mandible is pale flesh or bluish flesh-color.

Stomach contents.—Corn (trap bait) and gravel, 2; insects, seeds, and gravel, 1; seeds and gravel, 1; gravel and dung beetles, 1.

¹ Beebe, *Zoologica*, 6, pp. 201–204, 1925.

² Colors in quotation marks from Ridgway, *Color Standards and Color Nomenclature*, 1912.

Crypturellus cinnamomeus goldmani (Nelson). GOLDMAN'S TINAMOU. GALLINA DE MONTE.

Crypturus sallaei goldmani Nelson, Proc. Biol. Soc. Wash., 14, p. 169, September 25, 1901—Chichen Itzá, Yucatan.

Crypturus cinnamomeus Salvadori (not *Tinamus cinnamomea* Lesson). Cat. Birds Brit. Mus., 27, p. 541, 1895—part, Volcán de San Miguel; La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 455, 1904—part, Volcán de San Miguel; La Libertad.

Crypturellus cinnamomeus cinnamomeus Conover, Proc. Biol. Soc. Wash., 46, p. 113, June 30, 1933—part, Mt. Cacaguatique; Volcán de San Miguel.

Specimens and records.—Divisadero, 1; Volcán de San Miguel, 3; Mt. Cacaguatique, 2; Barra de Santiago, 1; Chilata, 1. Noted at San Salvador; previously recorded from Volcán de San Miguel and La Libertad.

Status.—Common resident of the Arid Lower Tropical Zone in the southwestern and northeastern departments (fig. 10). Occurs from sea level up to 4,000 feet, and when found at the higher altitudes it occasionally enters the oak association of the Arid Upper Tropical Zone (pl. XII).

Remarks.—It is with some hesitation that we refer these specimens to the Yucatan race, particularly since Mr. Conover considers them to be *cinnamomeus*. On geographic grounds such an allocation seems most improbable, but careful comparison of the series with topotypes of *goldmani* in the collections of the Biological Survey fails to bring to light any significant differences which are not covered by individual variation. The complete separation of the two El Salvador colonies of *goldmani* by the typical form *cinnamomeus* is a seeming incongruity, the solution of which undoubtedly lies in a better knowledge of the distribution of the former race in eastern Guatemala.

The subspecies *goldmani* differs from *cinnamomeus* in possessing a decidedly paler and more yellowish (less reddish) coloration in both sexes, with more restricted blackish crown patch in the males and more pronounced barring on the chests of the females.

There appear to be no differences in the habits of the two races, and both inhabit apparently identical environments. Considering also the very uniform climatic conditions prevailing over the Salvadorean range of the species, one is at a loss to account for the presence of two forms, other than by the supposition that one is a relatively recent invader.

Order COLYMBIFORMES. Grebes

Family COLYMBIDAE. Grebes

***Colymbus dominicus brachypterus* Chapman. MEXICAN GREBE.**

Colymbus dominicus brachypterus Chapman, Bull. Amer. Mus. Nat. Hist., 12, p. 256, 1899—Lomita Ranch, Lower Rio Grande, Texas; Miller, Condor, 34, p. 8, Jan., 1932—Lake Olomega (habits).

Specimens and records.—Lake Olomega, 9; Lake Ilopango, 2; Lake Chanmico, 4; Colima, 1. Also noted at Lake Guija.

Status.—Common resident on fresh-water ponds and lakes throughout the Arid Lower Tropical Zone.

Remarks.—Careful comparison of El Salvador skins with a series of virtual topotypes of *brachypterus* from Brownsville, Texas, loaned by the Museum of Comparative Zoology, fails to disclose any differences of moment. Measurements of specimens from Texas, El Salvador, and Lower California are given herewith.

	Wing	Exposed Culmen
5 males from Texas	88-93	22.7-24.3
5 males from El Salvador	88-92	22.2-24.1
8 males from Lower California	85-89	20.0-21.3
4 females from Texas	85-92	20.5-23.6
6 females from El Salvador	83-91	19.2-20.0
2 females from Lower California	85-86	16.7-18.3

In addition to possessing a smaller bill the Lower California birds are definitely darker below, particularly when in breeding plumage.¹

The Mexican grebe is permanently resident on all suitable bodies of water below about 2,500 feet altitude, for the species was collected or observed in the months of January, February, March, May, July, August, and September. It is apparently confined to fresh water, however, for none was seen in the tidal lagoons at Puerto del Triunfo and Barra de Santiago, nor even in the brackish marshes at San Sebastián where the flow of the Lempa meets the sea. The numbers present in any given locality seem to be governed more by the size of the body of water than by the density of marsh growth about the shores. At Lake Olomega, where the ideal combination of concealing growth bordering a large sheet of shallow water existed, these little grebes were more abundant than in any other locality.

¹Lower California least grebes have recently been named as *Colymbus dominicus bangsi* by van Rossem and Hachisuka (Trans. San. Diego Soc. Nat. Hist., 8, p. 323, June 15, 1937).

Although not nearly so gregarious as some other members of the family, *brachypterus* is usually encountered in little companies of three or four or half a dozen during the winter and spring months. In the breeding season, although most of the birds are then to be found in pairs, the desire for companionship is expressed in the grouping of the nests, several of which are customarily to be found within sight of one another.

Bat falcons (*Falco albigularis*) undoubtedly account locally for considerable numbers of these grebes. In May, 1912, a family of six of these falcons, two old birds and four young, were subsisting in large part on grebes which were present in numbers on Lake Channmico. The grebes were struck while on the water and were then dragged over the surface to some low stumps on the shore, there to be skinned in typical falcon fashion, the breast meat carefully eaten off and the rest of the carcass discarded.

Nesting.—Laying does not commence much before the latter part of July. Specimens taken as late as May 25 at Lake Channmico showed no breeding activity, and the birds were still in small flocks. At Lake Olomega two nests were found on August 1, 1925, each of which contained four nearly fresh eggs, and in addition there were several other partially completed nests nearby. The latest date for fresh eggs was September 4, 1925, when two sets of four were found. All nests were of the usual accumulations of decaying weeds and were prevented from drifting by being more or less surrounded by growing reeds or other vegetation. For the most part the nests floated on water about two feet deep.

Plumage notes.—It appears that adults have dusky throats throughout the year (less blackish in winter than in the breeding season, however), and that only the chin is white in the winter plumage. Birds having extensively whitish throats as well as chins are almost certainly less than one year old. The prenuptial molt occurs in late May, or at least commences at that time.

Colors of soft parts.—Newly hatched chick: bill, bluish flesh-color mottled with black; loreal space, dull orange; tarsi and feet, blackish plumbeous; iris, dark brown. Breeding adult: bill, black, occasionally mottled on mandible with flesh color; tarsi, feet, and loreal space, black; iris, orange (one female) or bright yellow (one male). Birds less than one year old have the mandible extensively mottled with flesh color.

Stomach contents.—In addition to being solidly packed with feathers from the body plumage the stomachs of three birds contained the remains of small aquatic insects.

Podilymbus podiceps antillarum Bangs. SOUTHERN PIED-BILLED GREBE.

Podilymbus podiceps antillarum Bangs, Proc. New Eng. Zool. Club, 4, p. 89, March 31, 1913—Bueycito, Oriente, Cuba.

Specimens and records.—Lake Olomega, 1 (August 29, 1925). Also noted at Lake Ilopango (April 13, 1912).

Status.—An apparently rare summer visitant to fresh-water lakes in the lowlands of the Salvadorean Oriente. Occurs as a migrant on lakes in the interior.

Remarks.—The single specimen of the pied-billed grebe secured is so much smaller than birds from the United States that we have no hesitancy in listing it under the above name. Wetmore¹ has already indicated that the name *antillarum* should be used for the breeding pied-billed grebes of Mexico. The measurements of the El Salvador bird, an adult male, are as follows: wing, 125.0 mm.; exposed culmen, 12.4; depth at nostril, 10.5; tarsus, 39.5; middle toe and claw, 54.5.

The actions of the specimen collected were certainly those of a nesting bird, and dissection showed it to be in full breeding condition. What was presumably its mate was seen in the same dense patch of marsh growth a few days later.

Five pied-billed grebes seen at Lake Ilopango on April 13, 1912, were in all probability transients in the vicinity, for that lake is not particularly suitable as a breeding station. The record is included under the present name on purely presumptive grounds.

Colors of soft parts.—Adult male: iris, dark brown; eyering and bill, bluish white; loreal space and ridge of culmen, bluish horn-color; band on bill, blackish slate; tarsi and feet, mottled olive and dusky black.

Order PELECANIFORMES. Totipalmate Swimmers

Family PHAETHONTIDAE. Tropic-birds

Phaëthon aethereus mesonauta Peters. NORTHERN RED-BILLED TROPIC-BIRD.

Phaëthon aethereus mesonauta Peters, Occ. Papers Bost. Soc. Nat. Hist., 5, p. 261, April 15, 1930—Almirante Bay, Panama.

¹ New York Acad. Sci., 9, pt. 3, 272, 1927.

Phaethon aethereus Grant (not of Linnaeus), Cat. Birds Brit. Mus., 26, p. 457, 1898—part, Acajutla; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 138, 1901—part, Acajutla.

Specimens and records.—Specimens none. Recorded from Acajutla.

Status.—Apparently of rare occurrence coastwise.

Remarks.—The above record is the only known occurrence of the red-billed tropic-bird in El Salvador. According to Salvin and Godman this bird was obtained by Captain Dow, who collected occasional bird skins along the coast of El Salvador in the early '60's. The date of capture is unrecorded in either the *Biologia* or *Catalogue of Birds*.

Family PELECANIDAE. Pelicans

***Pelecanus occidentalis occidentalis* Linnaeus. WEST INDIAN BROWN PELICAN. PELECANO.**

Pelecanus onocrot[alus] β *occidentalis* Linnaeus, Syst. Nat., ed. 12, 1, p. 215, 1766—Jamaica.

Specimens and records.—Puerto del Triunfo, 1. Also noted at La Libertad; Acajutla; Barra de Santiago; La Unión; Lake Olomega.

Status.—Common resident coastwise throughout the year both on open beaches and in the mangrove lagoons. Occurs also on fresh water a short distance inland.

Remarks.—In addition to the single skin, a specimen was also prepared as a skeleton. Both of these examples show that the pelicans of the west coast of Central America are not *P. o. californicus*, as would be expected, but are very similar to, if not identical with, the race occurring in the West Indies. The measurements of the single skin, a fully adult female in breeding plumage, are: wing, 500; culmen, 288; tarsus, 73; middle toe and claw, 90.

No nesting colonies were discovered within the boundaries of El Salvador, but there is a large breeding colony on one of the islands in Honduran waters in the Gulf of Fonseca. It is probable that most if not all of the pelicans found throughout the year along the coast of El Salvador repair to that place to nest. By far the majority of the pelicans seen in El Salvador were immature birds, and it was notable that the proportion of adults decreased materially at the points most distant from the Gulf of Fonseca.

Colors of soft parts.—Adult female, nearly ready to breed: iris, creamy white; bill, bone white, coral red laterally at tip; pouch, dark olive-green; facial skin, slaty black; orbital region, dull red.

Family PHALACROCORACIDAE. Cormorants

Phalacrocorax olivaceus mexicanus (Brandt). MEXICAN CORMORANT. PATO CHANCHO.

Carbo mexicanus Brandt, Bull. Sci. Acad. Imp. Sci. St. Pétersb., 3, No. 4, col. 56, Nov. 16, 1837—Mexico.

Phalacrocorax olivaceus mexicanus Miller, Condor, 34, p. 9, January, 1932—Lake Olomega (nesting habits).

Phalacrocorax vigua van Rossem (not *Hydrocorax vigua* Vieillot), Condor, 29, p. 26, January, 1927—El Salvador.

Specimens and records.—Lake Olomega, 2; San Sebastián, 6. Also noted at Lake Guija. Recorded from "Salvador," Lake Olomega.

Status.—Common, or locally abundant, resident of fresh and brackish water lakes and ponds on the coastal plain and occasionally in the interior. The species is apparently entirely absent from salt water.

Remarks.—The colony at Lake Olomega was by far the largest in El Salvador for, including adults and immatures, it consisted of approximately 2,000 birds. This concentration in a limited area was because of the presence of immense schools of small fish which provided an almost limitless food supply not only for the cormorants, but for anhingas, pelicans, man-o'-war-birds, and herons of several species. Especially prominent in numbers were catfish (*Galeichthys guatemalensis*), top-minnows (*Mollienisia sphenops*), and the peculiar "cuatro ojos" or four-eyed fish (*Anableps dowii*). The cormorant colony at San Sebastián was very much smaller, even though the habitable area was infinitely greater. San Sebastián is an immense network of sloughs, lagoons, and channels, comprising a part of the delta of the Lempa River. Its water is derived partly from that stream and partly from the tidal rise in the shallow estuary called Concordia Bay. Except at the end of the dry season when the river is at its lowest level, the water is only slightly brackish to the taste. In this locality there were perhaps 500 cormorants, scattered for the most part in little groups of five or six pairs in the larger lagoons. Practically all of the cormorants seen at Lake Guija were immatures of the previous year, and no signs of nesting were observed there. There were not more than 200 birds all told in that locality in May, 1927, and the fishermen living at the lake said that at some seasons the species was totally absent.

The cormorant population of Lake Olomega centered at a small island of perhaps five acres in extent and lying near the south shore. Although the island was formerly well wooded, most of the trees had been killed by the excrement of the roosting birds, and the bare, whitened branches were beginning to decay and to fall with every hard windstorm. During the day the cormorants spent most of their time on the water or roosting on the innumerable rocks and dead snags along the shore, and it was only toward evening that they began to gather in any numbers on the island. Although on dark nights every available perch was occupied, on bright, moonlight nights there were relatively few birds present, for the majority were out on the lake fishing.

Several night visits were made to the island, for besides the cormorants it was the roosting place for more than a few anhingas, herons, and occasional hawks. From the ground below, the outlines of the roosting cormorants could be plainly and fairly sharply seen against the sky, but the instant the flashlights were turned on them every bird in the beam of light disappeared. Close scrutiny would reveal toes and webs curled around whitened perches, and sometimes bills could be dimly seen, but from the eyes and plumage there was no reflection whatever. Except for the betraying outlines of the toes the birds were absolutely invisible, even when centered in the beam. It was obvious that the plumage of the cormorants possessed light-absorbing qualities far beyond that of the black feathers of other birds—the plumage of a black vulture, for example, shows up plainly enough under similar circumstances—and one is naturally tempted to speculate on the possible advantages or disadvantages of such a condition. In the pursuit of fish under water it may well be that the absence of light-reflecting qualities is a distinct advantage to the cormorant.

In a populous community such as the Lake Olomega colony, fishing involved relatively little effort on the part of the colony as a whole. For the most part the birds seemed content to hold down their favorite perches along shore, always with an eye toward the few scouts which were flying or swimming about the lake. When the actions of these latter indicated a school of fish, the shore contingent streamed out from every direction, diving under water or pursuing those individuals which had caught their prey, but had not yet had time to swallow it. The aftermath of such a flurry was a resting, rafted flock with some few unfortunates still assailed from every side as they frantically tried to swallow their catch.

Soon all were winging their way back to the stubs and trees, where each new arrival was greeted with a prodigious amount of bowing and grunting. The native name of "Pig Duck" is particularly well chosen for this extremely vocal cormorant.

Nesting.—The earliest date for laying was July 25, 1912, when a fully formed egg was taken from a female at San Sebastián. This is probably ahead of the normal time, for the Lake Olomega birds were only commencing to build their nests during the first week in August, 1925. A visit was made to the island colony at the latter place on August 3, when most of the nests were in the first stages of construction. They were being built in slender, though rather tall, trees and were invariably inaccessible. Thirty feet above the ground was perhaps the average for all nests and in addition they were usually placed well out toward the tips of the branches. The material used was rather slender mimosa twigs and branches, freshly plucked and with the foliage still attached. The birds in placing the first layer across the selected fork were unbelievably awkward. They simply dropped the twig; if it caught in the crotch, well and good; if it fell to the ground twenty or thirty feet below, they looked stupidly after it for a few moments and then departed for new material. The ground was littered with fallen twigs, but only a few birds were ever seen salvaging any. On the 18th and 22nd of the month most of the nests held two, three, or four eggs which, because of the locations of the nests, were inaccessible. For a pair of caracaras and several black vultures which were usually to be found in the colony, unguarded eggs and fallen young probably provided ample provender.

Plumage notes.—The white filaments on the head and neck are acquired about a month previous to nesting and are worn by both sexes. The juvenal plumage is apparently worn a full year with little or no change, but whether the adult plumage is attained the second year is not known to us.

Colors of soft parts.—Adults: iris, greenish blue; eyelids, bright, delft blue; pouch, dirty, yellowish brown; legs and feet, black; bill, dusky horn-color.

Family ANHINGIDAE. Darters

Anhinga anhinga (Linnaeus). WATER-TURKEY. PATO AGUJA.

Plotus anhinga Linnaeus, Syst. Nat., ed. 12, 1, p. 218, 1766—Brazil.

Anhinga anhinga van Rossem, Condor, 29, p. 26, January, 1927—El Salvador.

Specimens and records.—Lake Olomega, 3; San Sebastián, 5. Also noted at Lake Chanmico; Lake Guija.

Status.—Common fresh-water resident of the coastal plain. Casual on interior lakes below 1,500 feet, but apparently not breeding there.

Remarks.—Like the Mexican cormorant the water-turkeys were confined strictly to fresh water and were not detected anywhere along the seacoast proper. The only locality not occupied by both species in common was Lake Chanmico, a body of water entirely too small to support even a limited colony of cormorants. Although the ecologic niche filled by the two species was essentially the same, the water-turkeys tended to favor bayous, small rivers, and flooded forests in preference to the larger areas of open water. The comparatively secluded retreats were entirely in keeping with the more solitary habits of the water-turkeys, for normally they preferred to fish alone rather than in the company of others of their kind. The method of fishing, too, was different from that employed by the gregarious cormorants—a quick plunge from a lookout perch rather than a pell-mell chase.

Water-turkeys possess powers of flight far in advance of the heavy-bodied cormorants; in fact their abilities at times are more to be compared with their not distantly related kin, the pelicans. For hours at a time they soared on set wings over Lake Olomega, sometimes alone but more often in company with pelicans, wood ibises, and man-o'-war-birds, their long, powerfully feathered tails fanned out to provide the maximum of lifting surface. Paradoxical as it may appear, however, their instincts in moments of sudden fright take them in a plummet-like dive into the water below.

Nesting.—At San Sebastián on July 29, 1912, a colony of thirteen pairs was found in some small, thorny trees in a section of flooded forest near a big tule marsh. These nests were near the tops of the trees and as a rule were placed on small horizontal forks and flattened twigs. They were very small for such large birds, the largest being scarcely a foot in diameter. The material used was what appeared to be small roots which had been worked into the nests while wet and pliable, but which when dry made very firm structures. Four nests examined held four, three, and two single eggs, respectively; other nests were obviously incomplete so it is safe to say that the nesting season was just beginning.

Plumage notes.—It is certain that more than one year is necessary for the attainment of the full plumage of the males. In the one-year-old plumage the males breed, at least occasionally, for a bird in this plumage was shot from a nest in the San Sebastián colony.

Stomach contents.—At Lake Olomega the food consisted for the most part, if not entirely, of catfish. In the stomach of a female shot at that place on August 29, 1925, was a catfish (*Galeichthys guatemalensis*) about eight inches long, the dorsal spine of which projected through the stomach wall for about three-quarters of an inch. The bird did not seem to be inconvenienced in the least and was busily preening itself when shot from the top of a large stub on the lake shore.

Colors of soft parts.—Female adult: iris, dark brown; tarsi and feet, dusky orange-brown; maxilla, brown; mandible and pouch, dull orange.

Family FREGATIDAE. Man-o'-war-birds

Fregata magnificens rothschildi Mathews. MAN-O'-WAR-BIRD. ALCATRÁZ.

Fregata minor rothschildi Mathews, Bds. Australia, 4, p. 280, 1915—Aruba, Dutch West Indies.

Specimens and records.—Barra de Santiago, 1 (March 31, 1927). Also noted at La Libertad; Acajutla; Puerto del Triunfo; La Unión; Volcán de Conchagua; Lake Olomega.

Status.—Common resident coastwise and also present throughout the year (but not breeding) on Lake Olomega.

Remarks.—While no breeding colonies of man-o'-war-birds were found within the limits of El Salvador there is, or was in past years, one on Bird Island in the Gulf of Fonseca,¹ and most if not all of the El Salvador birds are probably from that place. This island is in Honduran waters. Swarth² has indicated that the name here used applies both to birds from the Caribbean and from western Mexico.

Every coastwise steamer has its accompanying band of man-o'-war-birds, which divide their time between foraging for refuse from the ships and harrying pelicans, gulls, and terns. They are common in all salt-water lagoons but, as above remarked, do not breed there, and most of the individuals observed were white-headed young. At Lake Olomega a dozen or more were often in sight, circling over

¹ Taylor, Ibis, p. 150, 1859.

² Condor, 35, pp. 148-150, Sept., 1933.

the lake on the lookout for successful cormorants. The promptness with which the latter disgorged the results of a dive was astonishing, especially when attacked by two or more pirates at once. On Volcán de Conchagua, which projects as a peninsula between the ocean and the Gulf of Fonseca, man-o'-war-birds were often seen drifting several hundred feet above the summit and thus at an altitude of over 4,000 feet.

Colors of soft parts.—Adult, non-breeding male: iris, brownish black; feet, black; bill, horn gray, tip, black; pouch, flesh color.

Order CICONIIFORMES. Herons, Storks, Ibises, Flamingoes,
and Allies

Family ARDEIDAE. Herons and Bitterns

Ardea herodias herodias Linnaeus. GREAT BLUE HERON.
GARZÓN CENIZA.

Ardea herodias Linnaeus, Syst. Nat., ed. 10, 1, p. 143, 1758—Hudson Bay.

Specimens and records.—No specimens. Noted at Puerto del Triunfo (December 20, 1925 to January 27, 1926); Lake Olomega (February 3 and April 6 to 12, 1926); Colima (January 21, 1927); Acajutla (March 30, 1927); San Salvador (April 19, 1912); Lake Guija (May 25, 1927).

Status.—Fairly common winter visitant along the seacoast and to lakes and ponds throughout the country. Extreme dates of arrival and departure are December 30 and May 25.

Remarks.—The subspecies to which the great blue herons wintering in El Salvador belong is tentatively considered to be *herodias*, although no specimens were secured. Oberholser¹ considers all Central American individuals of this species to be *Ardea herodias lessonae* Wagler. Carriker² states that the typical race, *herodias*, is a winter visitant to Costa Rica, and more recently Peters³ has found *herodias* to be a winter visitant in the Almirante Bay region in western Panama. It is in the category of migrants that the El Salvador birds certainly belong, for the species was entirely absent from the end of May to the end of December.

Although every effort was made to secure specimens of these always wary herons, their wildness rendered all attempts futile. However, probably a hundred all told were seen at one time or

¹ Proc. U. S. Nat. Mus., 43, p. 555, 1912.

² Ann. Carnegie Mus., 6, p. 428, 1910.

³ Bull. Mus. Comp. Zool., 71, February, p. 304, 1931.

another, mostly in the mangrove lagoons along the coast and at Lake Olomega. Such a date as May 25 would appear to be very late for migrants. Two single birds seen at Lake Guija on that date were evidently transients for they were not noted either before or after that time.

Casmerodius albus egretta (Gmelin). AMERICAN EGRET. GARZA BLANCA.

Ardea egretta Gmelin, Syst. Nat., 1, pt. 2, p. 629, 1789—Cayenne.

Casmerodius albus egretta van Rossem, Condor, 29, p. 26, 1927—Salvador.

Specimens and records.—Lake Olomega, 1 (August 18, 1925). Also noted at Rio Goascorán; Puerto del Triunfo; Barra de Santiago; San Sebastián. Recorded from "Salvador."

Status.—Formerly common, but now a relatively rare resident of marshy areas throughout the lowlands.

Remarks.—The history of egrets in El Salvador in no way differs from that in any other country where the plume hunters have penetrated. There were formerly large colonies at Lake Olomega and at various other points, but these have been shot out, and there now remain only scattered pairs or small flocks where abundance was once the rule. Although the traffic in heron plumes is now prohibited by paper decree, egrets are still hunted, and their pursuit probably will continue as long as one is left alive.

Leucophoyx thula thula (Molina). SNOWY EGRET. GARZA BLANCA.

Ardea thula Molina, Sagg. Stor. Nat. Chili, p. 235, 1782—Chile.

Specimens and records.—No specimens. Noted at Lake Olomega (April 6 to September 20); San Sebastián (many July dates).

Status.—Occurs in the spring, summer, and early fall months and probably throughout the year on fresh-water lakes and swamps on the coastal plain.

Remarks.—Snowy egrets have suffered even more than the larger species and are now reduced almost to the vanishing point. The few individuals which were seen were so wild that they could not be approached within effective shotgun range. They are sometimes kept as pets, and a pair was seen in the patio of the residence of the American consul in 1912.

The assignment of El Salvador birds to the subspecies *thula* is on purely presumptive grounds.

Dichromanassa rufescens dickeyi van Rossem. DICKEY'S EGRET.

Dichromanassa rufescens dickeyi van Rossem, Condor, 28, p. 246, September, 1926—San Luis Island, Gulf of California.

Specimen collected.—Barra de Santiago, 1 (April 2, 1927).

Status.—Apparently rare spring migrant coastwise.

Remarks.—The reddish egret was met with on but one occasion when, at Barra de Santiago, one was collected as it stalked about in the shallow water of the tidal lagoon. Dissection showed it to be a nonbreeder, a male with testes completely dormant. There was no trace of nuptial plumes apparent, and its bill coloring showed it to be a bird of the previous year.

This specimen is assigned to *dickeyi* somewhat arbitrarily for it is darker even than the darkest specimens of that form. Whether this individual actually came from the Gulf of California, or whether *dickeyi* breeds south along the west Mexican coast and this bird came from some such locality, cannot of course be decided. Certainly no race of the reddish egret breeds anywhere in El Salvador.

Hydranassa tricolor ruficollis (Gosse). LOUISIANA HERON.
GARZA PINTADA.

Egretta ruficollis Gosse, Birds of Jamaica, p. 338, 1847—Jamaica.

Specimens and records.—San Sebastián, 4; Lake Olomega, 1. Also noted at Puerto del Triunfo; Barra de Santiago; Lake Guija.

Status.—Common resident on the coastal plain and on Lake Guija. Most numerous in the mangrove lagoons along salt water.

Remarks.—Next to the little blue heron, Louisiana herons were the commonest members of the family in the republic. Indeed, along the coast where the little blue was found in lesser numbers than inland, the Louisianas outnumbered all other herons combined.

In contrast to some of the other species the Louisiana was very seldom found to occur in flocks, but habitually worked singly or in pairs, stalking stealthily on the mud flats at the edges of the mangroves or wading thigh-deep in shallow water. In maritime localities feeding time was necessarily confined to low water. When the tide had risen to a point where wading was no longer possible, the birds sought refuge on the mangrove roots and remained there until the first reappearance of the higher mud bars.

Nesting.—Specimens taken at San Sebastián during the latter part of July, 1912 were certainly breeding at the time. At Lake

Olomega juveniles still in the nestling plumage began to appear the latter part of August, 1925. It is probable that the main nesting antedates the end of July by several weeks.

Colors of soft parts.—Fully grown juvenile: iris, yellowish white; legs and feet, olive-green, toes and lower anterior portion of tarsus, darker; maxilla, dull black; mandible, orange flesh-color; loral skin, dull orange.

Florida caerulea caerulescens (Latham). SOUTHERN LITTLE BLUE HERON. GARZA AZÚL.

Ardea caeruleascens Latham, Index Orn., 2, p. 690, 1790—Cayenne.

Specimens and records.—San Sebastián, 1; Lake Olomega, 3. Also noted at Divisadero; Puerto del Triunfo; Rio San Miguel; La Unión; Colima; Barra de Santiago; Lake Guija; Santa Rosa.

Status.—Common resident of lakes, streams, and ponds below 1,500 feet altitude.

Remarks.—The three specimens collected, two adults and an immature which retains only a few white feathers, all possess the dark coloration characteristic of *F. c. caerulescens*. This form has been shown to be the one occurring in the West Indies¹ so its presence in Central America requires no comment other than that it provides further evidence of the close relationships existing between the water birds of the two areas.

The little blue was the most numerous of Salvadorean herons as well as the most generally distributed. Although it is confined to those portions of the Arid Lower Tropical Zone lying below 1,500 feet, there are few streams or even temporary overflow ponds of the rainy season which are not visited now and then by wandering individuals. The center of abundance at all seasons is the coastal plain, with a decided preference for fresh water. It is doubtful if many adults wander away from the lowlands. By far the majority of the little blue herons seen at such inland localities as Lake Guija, Colima, and Divisadero were immatures in white or pied plumage and probably were stragglers which had spread out over the country following the nesting season.

Colors of soft parts.—Immatures: iris, yellowish white; skin of face, gray-green; bill, pale, dirty bluish basally with terminal half black; legs and feet, olive-green often tinged with bluish. The green

¹ Riley, Smiths. Misc. Coll., 47, p. 279, 1904; Wetmore, Sci. Surv. Porto Rico & Virgin Ids., N. Y. Acad. Sci., 9, pt. 3, p. 293, 1927.

si are the best means of identifying the young of the little blue heron in the field. The snowy heron of similar size has black tarsi and yellow-green feet.

Stomach contents.—Small fish, 1; dragon-fly larvae and aquatic insects, 1.

***Butorides virescens maculatus* (Boddaert). SOUTHERN GREEN HERON. GARZETA, MARTINETTA.**

Cancroma maculata Boddaert, Tabl. Planch. Enl., p. 54, 1783—Martinique, Lesser Antilles.

Butorides virescens van Rossem (not *Ardea virescens* Linnaeus), Condor, 29, p. 26, January, 1927—Salvador.

Butorides virescens maculatus Miller, Condor, 34, p. 11, January, 1932—Lake Olomega; habits.

Specimens and records.—San Sebastián, 4; Barra de Santiago, 1; Lake Guija, 2; Lake Olomega, 5; Rio San Miguel, 1. Also noted at Lake Chanmico; Puerto del Triunfo. Recorded from Lake Olomega.

Status.—Common resident in suitable localities throughout the arid Lower Tropical Zone. The center of abundance is on the coastal plain, from the mangrove belt along the coast to the fresh-water lakes and marshy streams a short distance inland (pl. XXIV).

Remarks.—The determination of the systematic status of the series of thirteen resident green herons presents some difficulties, but we have finally concluded to consider them closest to the West Indian race even though they are not identical with it. The peculiarities displayed make further comment desirable.

In a recent survey of a series of green herons from the humid Atlantic coast of western Panama, Peters¹ noted that there were two color phases present, a normal one very similar to that in typical *B. v. virescens* and *B. v. maculatus* and, in addition, a melano-erythristic type. An equally great color range is apparent in the El Salvador series, but the variation is toward extreme paleness, a tendency which is probably the result of residence on the arid Pacific side of the continent. The lightest individuals are very similar in color to *B. v. anthonyi*, but are noticeably whiter on the median underparts; the darkest are decidedly darker than *virescens*, but are not sufficiently deeply colored to be called melanistic. To add to the preliminary uncertainty there was found to be a decided tendency toward local grouping of the color variations, and because

¹ Bull. Mus. Comp. Zool., 71, pp. 305—307, February, 1931.

of this there was at first a temptation to recognize these groupings by name. In order to make the situation more graphic, the areas inhabited by the dark, medium, and pale colonies, respectively, are outlined on the accompanying map (fig. 11). These colonies are not in reality isolated, for numerous perpetual streams or marsh land link them to one another; indeed the area between Lake Olomega, the region occupied by the palest birds, and San Sebastián, where the darkest were found, is an almost continuous marsh. Furthermore an arrangement by characters, that is, with the palest bird at

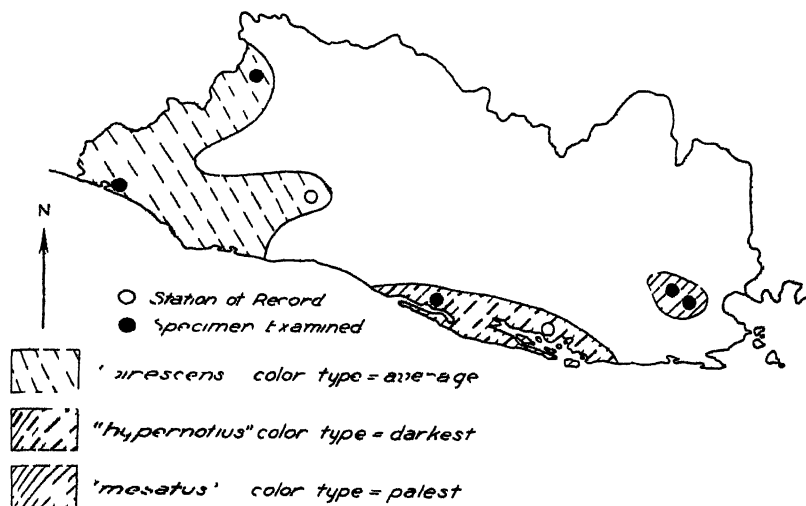


FIG. 11 Distribution of the color phases of the southern green heron, *Butorides virescens maculatus*, in El Salvador

one end of the series and the darkest at the other, shows an overlapping of the characters which is not correlated with distribution, so it is evident that the local variations noted are only tendencies and do not represent geographic races in the currently accepted sense.

Summarizing the facts at hand, it seems that a melanistic race of the green heron may be in process of development on the humid Atlantic coast and a pallid one on the arid Pacific side, but that as yet the majority of birds are not, with certainty, distinguishable from the more stable form, *maculatus*, of the West Indies.

It is quite evident that Dr. Oberholser was unaware of the individual variation among Central American green herons when he reviewed the group in 1912. We have examined his types of *B. v. "hypernotius,"* described from Panama, and *B. v. "mesatus"* from

Nicaragua, and can match them with El Salvador skins. Under these circumstances we are forced to consider both of these names synonyms of *maculatus*.

Wing measurements of the Salvador series of thirteen skins show a variation of only ten millimeters. They range from 165 to 175 mm. with an average of 172 mm., both extremes represented by males. These measurements closely approximate those of *maculatus*.

While, as herons go, the little green herons were generally distributed and fairly common, they were greatly exceeded in numbers by both the little blues and Louisianas. Green herons wherever they are found are not markedly gregarious, and after the loose colonizing during the breeding season are likely to be found as individuals and not in flocks. The postbreeding dispersal in the case of the local form is probably not as extensive as in less well-watered regions, for usually there was a great deal of "open" territory for a considerable radius about the breeding colonies.

Nesting.—At Lake Guija in the latter part of May, 1927, a few pairs had started nest building in the low trees around the shore line of a small island near the south shore. Egg laying must start about the first of June, for in the latter half of July at San Sebastián in 1912, and at Lake Olomega in 1925, young just able to leave the nests and scramble around in the bushes were observed. At the same time several second sets of fresh eggs were found. Specific dates for the latest eggs were July 16, 1912 at San Sebastián, and July 29 and August 1, 1925, at Lake Olomega. All of the nests found were typical green-heron structure, differing in no essential particular from nests of the better-known northern races. In situation they tended to be placed considerably lower than the nests of *anthonyi* and *virescens* and were generally only about four or five feet above the water. Three and four seem to be the usual numbers of eggs laid, although a single incubated clutch of two was noted on August 1, 1925, at Lake Olomega. At San Sebastián some predator whose identity was never determined caused considerable havoc among the nesting green herons by breaking large holes in the eggs and eating the contents. However, a clue to the identity of the nest robber was obtained at Lake Olomega when a large water snake was found destroying the eggs in a green-heron's nest in July, 1925.

Colors of soft parts.—Adults: maxilla, black; mandible, dusky green with tomia black; preocular space, yellow-green; tarsi and feet, dull, light green; iris, orange-yellow.

Butorides virescens anthonyi (Mearns). ANTHONY'S GREEN HERON.

Ardea virescens anthonyi Mearns, Auk, 12, p. 257, 1895—Seven Wells, Salton River, Lower California.

Specimens collected.—San Salvador, 2 (March 12, 14, 1912).

Status.—Spring migrant on foothill streams.

Remarks.—The two specimens listed above are typical *anthonyi* and can be matched exactly by examples of that race from southern California and Arizona. The wings of these birds measure as follows: adult female No. 8483, 193 mm.; female of first spring, No. 8440, 185 mm. The latter specimen has been identified by Dr Oberholser as *B. v. eremonomus*, a form described from Chihuahua, Mexico¹ and which is said to differ from *anthonyi* in smaller size and more purplish neck. With every respect for Dr. Oberholser's opinion, we cannot recognize the individual in question as anything but *anthonyi*. Its slightly smaller size is due to immaturity, and in this respect as well as in color it is a duplicate of specimens of the same age from the southwestern United States.

Several other green herons which were seen on the same days as the above were possibly of the same subspecies. All of these birds were observed on a small river, the Acelhuate, which runs through the suburbs of San Salvador.

Nycticorax nycticorax hoactli (Gmelin). BLACK-CROWNED NIGHT HERON. QUACO.

Ardea hoactli Gmelin, Syst. Nat., 1, pt. 2, p. 630, 1789—Mexico.

Nycticorax nycticorax naevius van Rossem, Condor, 29, p. 26, January, 1927—Salvador (habits).

Specimens and records.—Lake Olomega, 1 (July 28, 1925). Also noted at Lake Guija (May 24, 1927); Lake Olomega (July 25 to September 20, 1925). Recorded from "Salvador."

Status.—Common, but extremely local, summer visitant to fresh-water lakes in the Arid Lower Tropical Zone.

Remarks.—Although black-crowned night herons were rather common at Lake Olomega in the late summer and early fall of 1925, they were apparently totally absent from the locality during the winter of that year and the spring of 1926. No signs of nesting were ever observed, even though adults in full plumage were present and the single adult male collected was in breeding condition. The

¹ Proc. U. S. Nat. Mus., 42, p. 546, 1912.

favorite roosting places were some tall trees along the south shore, and many birds also were seen at various times in the cormorant colony on an island in the lake.

Lake Guija was the only other locality in which these herons were found. On May 24, 1927, about a dozen adults and immatures flew out of a tree in which there was a nesting colony of boat-billed herons, but they at once left the locality and were never seen again. A two-year-old male which was shot from this flock, but which was not preserved, was a nonbreeder.

Black-crowned night herons were not found at any season in the mangrove lagoons on the coast.

Nyctanassa violacea violacea (Linnaeus). YELLOW-CROWNED NIGHT HERON.

Ardea violacea Linnaeus, Syst. Nat., ed. 10, 1, p. 143, 1758—South Carolina.

Specimens and records.—Barra de Santiago, 1 (March 31, 1927).

Status.—Detected only as a rare spring migrant on the seacoast.

Remarks.—At Barra de Santiago yellow-crowned night herons were very common between March 31 and April 13, 1927. The northbound water-bird migration was then at its height, and it is possible that a good portion of the night herons seen there were of the same nonresident race as the single specimen taken. This bird, a fully adult male which showed no signs of breeding, is so exactly like Georgia and Florida examples that we have no hesitancy in classifying it as *violacea*. It is separable at a glance from the larger, resident race. The measurements are as follows: wing, 285; tail, 113; exposed culmen, 65.5; depth at base, 21.5; tarsus, 95.5; middle toe minus claw, 58.5.

Nyctanassa violacea bancrofti Huey. BANCROFT'S NIGHT HERON.

Nyctanassa violacea bancrofti Huey, Condor, 29, p. 167, May, 1927—Scammon Lagoon, Lower California, Mexico; *ibid.* (Lake Olomega, Salvador); Peters, Check-list Bds. World, 1, p. 116, 1931—Salvador; A. O. U. Check-list, ed. 4, p. 31, 1931—Salvador.

Nyctanassa violacea van Rossem (not *Ardea violacea* Linnaeus), Condor, 29, p. 26, January, 1927—El Salvador.

Specimens and records.—Lake Olomega, 3; Puerto del Truinfo, 2. Also noted at Río Goascorán; Barra de Santiago. Recorded from Lake Olomega; "Salvador."

Status.—Common resident of mangrove lagoons along the seacoast; less numerous inland on the coastal plain. Not detected anywhere above an altitude of 200 feet.

Remarks.—The ranges of the several races of yellow-crowned night heron which have been described cannot be properly outlined until more material is forthcoming from critical localities. The form described from Lower California which extends southward along the Pacific coast of Mexico at least to El Salvador is very constant in the characters given by the original describer. It is larger, particularly as to bill, than specimens of the typical race from the south-eastern United States.

This subspecies is resident in El Salvador throughout the year and was particularly common about the coastal lagoons. Like other members of the family the present one is more or less nocturnal, and on moonlight nights may be fully as active as during the day. As most of its food in seacoast localities is necessarily obtained at low tide, the ability to see well at night is vital to the existence of the species in such places. Although good-sized flocks were often encountered roosting during the hotter hours or when waiting out a high tide, these herons as a rule worked singly and were more likely to be found in the company of ibises or other species of herons than with their own kind.

Nesting.—No nests were found, but the taking of a juvenile at Lake Olomega on August 1, 1925, which was out of the nest but a few days at most, indicates that in this country the species is a mid-summer breeder like the boat-bill. Soon after the first of August, young of the year became very numerous.

Plumage notes.—The period of time required to attain the fully adult plumage is somewhat problematical. Young birds in their first fall are the darkest and brownest and with subsequent molts become paler and grayer, but whether the maximum degree of grayness is reached the third or the fourth year is not certain. However, it seems certain that much of what has been called "individual variation" is more a matter of age than has been suspected.

Colors of soft parts.—Adults: iris, brownish orange; crus, posterior portion of tarsus, and soles of feet, dull orange; rest of tarsus and toes, blackish olive; bill, black. Juveniles: iris, orange-red; crus, olive-green; tarsi and feet, dark, brownish olive; bill, black; loreal space, dusky olive-green.

Heterocnus cabanisi (Heine). MEXICAN TIGER BITTERN.

Tigrisoma cabanisi Heine, Journ. fur Orn., 7, p. 407, 1859—Mexico.

Heterocnus cabanisi van Rossem, Condor, 29, p. 26, January, 1927—Salvador.

Specimens and records.—Lake Olomega, 3; San Sebastián, 4; Colima, 1. Also noted at Rio Goascorán; Puerto del Triunfo; Rio San Miguel; Barra de Santiago. Recorded from "Salvador."

Status.—Common resident on fresh-water ponds, rivers, and marshes throughout the length of the coastal plain. Detected in midwinter along the Lempa River at Colima and during midwinter and spring in the mangrove lagoons on the coast.

Remarks.—Although nowhere abundant the Mexican tiger bittern is regularly distributed wherever conditions are suitable. Like all bitterns it is solitary in habits and feeds singly along the shallow, weedy margins of streams and lakes. Tiger bitterns are more likely to be found in open water than is the common bittern of the north and, when not engaged in fishing or frogging, they customarily perch on stubs along the shore or even in the treetops. Thus, although typical bitterns in appearance, in behavior they are not unlike great blue herons.

Heterocnus has a very curious courtship performance which was witnessed at San Sebastián in July, 1912. A pair was noticed just after sundown standing in shallow, open water near the shore of a brackish lagoon, repeating over and over a set series of movements. First they stood bill to bill with necks and bodies horizontal and feathers on end, for all the world like a pair of gamecocks just before they come to grips. After remaining thus for a second or two the leader, probably the male, would advance with quick steps, at the same time raising the bill and neck vertically and depressing the neck and body feathers. Immediately on assuming this position it would give two or three of the characteristic loud, hoarse booms or roars, and then retreat and assume the first position. The receiver of all this attention followed in all of the body, head, and neck movements, but remained standing in the same spot. The leader went through the display with a determined and laughably pompous air while its mate acted as if hypnotized, as indeed she(?) probably was. The whole sequence did not take longer than five or six seconds. It was repeated four times in quick succession before both birds were frightened away by a dog running down to the waters' edge.

The hoarse boom of this great bittern can be heard at all times of the year and is not alone a mating call as in the case of *Botaurus*. In times of danger the neck feathers are flared out to their fullest extent, and a wounded bird will face its persecutor in this manner and lunge forward with extreme rapidity. The heavy, sharp bill at such times is a dangerous weapon, especially as the jab is always directed at the face.

Nesting.—At San Sebastián on July 21, 1912, a completed nest with the bird standing beside it was found about twenty feet above the water on a long horizontal branch of a large willow tree. It was made of fair-sized, dead twigs about a quarter of an inch in diameter, and in construction was typically heron-like, flimsily built and easily seen through from below. The structure was supported by several small shoots growing from the main branch. On the 26th the parent was on the nest, which was found to contain a single egg, already slightly soiled and evidently laid three or four days previously. The whereabouts of this egg is not known at the present time, for it was disposed of several years ago. The description written in the field is as follows: "Dull white, with a greenish tinge, of a rough grain, nearly equi-ended and about the size of a red-tailed hawk's egg." The parent watched from a nearby tree, but made no disturbance. Only one bird was ever seen about this nest. At Rio San Miguel in early February, 1926, a bird was seen several times carrying twigs to a nest at least thirty feet from the ground. This nest was larger and better built than the one at San Sebastián. It was not investigated for the sufficient reason that a good-sized wasps' nest hung near the trunk a few feet below the nest.

Plumage notes.—It is apparent that some time is necessary for the attainment of the adult plumage. The juvenal stage is very coarsely barred over the whole plumage, and the light bars and underparts are very pale colored. A juvenile taken April 13 is molting into the postjuvenal plumage which resembles the previous stage, but is more ochraceous; the barring is decidedly narrower and it is more or less vermiculated on the back and scapulars. Three postjuveniles (one year old) were molting into the subadult stage on July 15 and 16. This latter is just about intermediate between the postjuvenal and adult plumages. All the neck markings of the adult are present, but are light brown in color instead of black; the underparts are much redder than in the two former stages and are, like all the rest of the body, very finely barred. A specimen taken on January 21 represents this stage in its completion, and is already commencing a wing and tail molt into the adult plumage. In juvenal, postjuvenal, and subadult stages the remiges and rectrices are barred. It is inferred from the foregoing that two years and three preliminary steps precede the fully adult plumage. Two adults taken August 4 have just completed the annual molt.

Colors of soft parts.—Adults: iris, bright yellow; throat, greenish anteriorly, and yellow posteriorly; orbital, loreal, and malar skin,

yellowish green; mandible, black with tomia pale bluish horn-color; maxilla, pale, bluish horn-color.

***Botaurus lentiginosus* (Montagu). AMERICAN BITTERN.**

Ardea lentiginosa Montagu, Suppl. Orn. Dict., 1813, text and plate—Piddletown, Dorsetshire, England.

Specimen collected.—Lake Olomega, 1 (February 3, 1926).

Status.—Rare midwinter visitant to the lowlands.

Remarks.—The above specimen, which was taken in waist-high marsh growth, is the only record we have for the occurrence of the bittern in El Salvador.

***Ixobrychus exilis exilis* (Gmelin). EASTERN LEAST BITTERN.**

Ardea exilis Gmelin, Syst. Nat., 1, pt. 2, p. 645, 1789—Jamaica.

Specimens and records.—Lake Olomega, 2 (July 29; August 1, 1925).

Status.—Detected only as a rare summer visitant to the lowlands.

Remarks.—The least bittern very probably nests at Lake Olomega, for the two males collected there were in breeding condition. Two females were seen on July 29 in the same patch of hyacinth marsh where the males were taken, but no nests were found.

In wing and tail measurements, in comparatively slender, needle-like bills, and in color these two males are identical with topotypes of *exilis* from Jamaica. They are, therefore, more typical of *exilis* than are examples from eastern North America, for which the name *neoxenus* Cory may have to be revived.

Family COCHLEARIIDAE. Boat-billed Herons

***Cochlearius cochlearius zeledoni* (Ridgway). BOAT-BILLED HERON. GARZA CUCHARA.**

Cancroma zeledoni Ridgway, Proc. U. S. Nat. Mus., 8, p. 93, 1885—Mazatlán, Sinaloa, Mexico.

Cochlearius zeledoni van Rossem, Condor, 29, p. 26, January, 1927—Salvador.

Specimens and records.—San Sebastián, 1; Lake Olomega, 3; Zapotitán, 1. Also noted at Puerto del Triunfo; Lake Guija. Recorded from "Salvador."

Status.—Locally common resident on fresh-water marshes and lakes throughout the Arid Lower Tropical Zone. Occurs, during the winter at least, on salt water.

Remarks.—These curious travesties of the black-crowned night heron appear closely to parallel that species in habits. They feed

singly either by night or by day in the shallow waters of lake shores, along rivers, and in marshes and usually roost in companies, very often in association with black-crowned night herons. Like many other herons the boat-bills have excellent night vision; in fact a good proportion of their hunting is done after dark. As noted previously¹ there is no reflection from their eyes, a circumstance which appears in no way to affect their powers of nocturnal vision.

That boat-bills are extremely local in habits is attested by the fact that the same roosting tree on the banks of the Rio Sucio at Zapotitán which was used in 1912 was still in use in 1927, the only roost in the vicinity. A sawmill erected in 1925 had not caused a shift in location, even though the mill was only about 100 yards from the tree and was in daily operation.

Nesting.—At Lake Guija on May 24, 1927, a colony of about twenty pairs was found to be nesting in a single, large conacaste tree (*Enterolobium cyclocarpum*) which overhung a small, deep, alligator-infested pool formed by the overflow of a creek entering the lake. There was no means of securing eggs, nor even of determining the contents of more than two nests, for we could not climb the tree by any means at hand, and the nests were placed on the extreme outer branches which would not have supported human weight for an instant. All of the nests were similarly built and in construction and size resembled night heron nests. Glimpses of eggs could be had through two of the most lightly constructed lower ones. The parents were extremely tame, and for the most part the sitting birds could not be frightened into flight by guns fired under the tree, though at each shot they burst into a wild jumble of squawking and gabbling which lasted for several seconds.

Plumage notes.—The sequences of plumage appear similar to those of *Nycticorax*, but the material is too limited to be sure on this point. The juvenal plumage is followed by a grayish brown stage with underparts mixed buff and dirty grayish white, the former color predominant posteriorly, the latter most prominent on throat and lower neck. What is presumably a fully adult female has the forehead buff instead of white, and the occipital plumes are only about half as long as in the adult male. The upperparts of this female are exactly like those of an adult male except that they are slightly darker gray. The mantle on the upper back is black, exactly like the male. In a recent discussion of the sex differences in this species

¹ Van Rossem, Condor, 29, p. 26, 1927.

Griscom¹ considers that the adult females have a *brown* mantle and that the sexes are thus easily distinguishable in life. While there is no gainsaying the fact that some females have brownish upperparts and mantles, we consider such to be immature birds. Close scrutiny of a breeding colony of some twenty pairs failed to disclose any obvious sex differences between members of the pairs at the nests, other than that one at each nest was noticeably smaller and slightly darker in color. There remains the possibility that east and west coast boat-bills are racially distinct.

Colors of soft parts.—Adults and fully grown juveniles: pouch, dusky flesh-color; mandible, dusky yellow, black along tomia; maxilla, black; tarsi and feet, light olive-green; iris, dark brown.

Family CICONIIDAE. Storks and Wood Ibises

Mycteria americana Linnaeus. WOOD IBIS. SARJENTO.

Mycteria americana Linnaeus, Syst. Nat., ed. 10, 1, p. 140, 1758—Brazil.

Specimens and records.—Zapotitán, 2; San Sebastián, 1; Lake Olomega, 2. Also noted at Divisadero; Puerto del Triunfo; Rio San Miguel; Barra de Santiago.

Status.—Common resident of seacoast lagoons and of marshy country generally throughout the lowlands.

Remarks.—While nowhere abundant, wood ibises were found to be fairly numerous in the coastal mangrove lagoons and on inland marshes nearly everywhere on the coastal plain. The chief habitat requisite is shallow water combined with plenty of mud in which to feed; therefore such lakes as Ilopango and Guija, which for the most part have rocky bottoms and deep water extending to the shore line, are avoided in favor of more marshy localities. Such places as Lake Olomega and Zapotitán provide ideal conditions where one may find a hundred or more of these great birds at any time. As a rule they were seen in small flocks of from a dozen to a score or more, with occasional groups of as many as fifty. A large flock stretched out in a long line and feeding slowly across a shallow stretch of water presents a striking picture which one soon learns to associate with almost every lowland marsh. In the rainy season, when temporary ponds appear as the result of river overflow or poor drainage, wood ibises may appear as transients almost anywhere.

Jabiru mycteria (Lichtenstein) JABIRU. GARZÓN BLANCO.

Ciconia mycteria Lichtenstein, Abh. K. Akad. Wiss. Berlin (Phys. Kl.), p. 163, 1816-17 [1819]—Brazil.

¹ Amer. Mus. Novit., 235, pp. 10-11, 1926.

Specimens and records.—No specimens. Noted at Lake Olomega (February 3 to April 7, 1926).

Status.—Rare midwinter and spring visitant on the coastal plain.

Remarks.—The Jabiru is unquestionably a very rare bird in El Salvador for the species was noted only at Lake Olomega in the spring of 1926. In that locality two, very probably a mated pair, were often seen between the dates of February 3 and April 7. They were usually to be found, either singly or together, in the company of flocks of wood ibises in the shallow water along the north shore, a section which supported a particularly rank growth of water hyacinth, clumps of *Mimosa pudica*, and other aquatic and semi-aquatic plants. Although the water itself was here only a few inches in depth, it covered at least six feet of mud which was not firm enough to support the weight of a man. One could get about only by lying prone and using the hyacinth clumps as partial support, a procedure safe enough, but one accompanied by too much splashing and wallowing to be effective if the birds pursued were at all wary. Several attempts to secure jabirus by this method were unsuccessful for, although not particularly wild, they refused to permit one to get closer than a hundred yards. On April 7, Morales found one in a location where the bottom was relatively firm and many mimosa clumps gave ample cover for an approach. After a successful stalk he found the bird sound asleep, standing on both feet and with its head resting on the left shoulder. Although hit squarely at a distance of only about twenty yards it flew away apparently uninjured, but Morales, several weeks later, found what was undoubtedly the same bird dead in another part of the marsh. He saved the entire skeleton, but it was unfortunately thrown out during his temporary absence.

The impressive size of this great stork is best appreciated when it is seen in company with wood ibises or in the air when the pure white wings are stretched to their fullest extent. The wing beats are slow, about the rate of the beats of a great blue heron, but are tremendously powerful and, either because of flexibility in the carpal joint or of the widely spaced primary tips themselves, there is a smoothness and flow to the wing stroke which is astonishing in so large a bird.

Morales, who has hunted and lived on Lake Olomega for many years, said that he had never seen more than two jabirus in the same year and it was only in occasional years that any were present at all.

Family THRESKIORNITHIDAE. Ibises and Spoonbills

Plegadis guarauna (Linnaeus). WHITE-FACED GLOSSY IBIS.

Scolopax guarauna Linnaeus, Syst. Nat., ed. 12, 1, p. 242, 1766—Brazil.

Specimens and records.—Lake Olomega, 2 (August 22, 1925 and February 7, 1926).

Status.—Rare fall migrant and winter visitant to Lake Olomega.

Remarks.—The two specimens listed above were the only individuals noted during the course of the work in El Salvador. The one taken August 22 was a female of the year with streaked head and neck, while the midwinter bird was an adult female which was flying along the lake shore with a flock of white ibis.

Guara alba (Linnaeus). WHITE IBIS. GARZA PALOMA.

Scolopax alba Linnaeus, Syst. Nat., ed. 10. 1, p. 145, 1753—South Carolina.

Specimens and records.—Puerto del Triunfo, 3 (December 30, 1925 to January 16, 1926). Also noted at Lake Olomega (September 9, 1925 to April 7, 1926); Barra de Santiago (April 1 to 13, 1927).

Status.—Common from early September to mid-April on coastal plain lakes and in the mangrove lagoons along the coast.

Remarks.—Although no nesting colonies of white ibis were found, the species is said to breed locally in the more secluded parts of the mangroves along the coast. However, no old nesting sites were discovered personally in any of the three mangrove localities visited at various times of the year, such as Puerto del Triunfo in mid-winter, Barra de Santiago in April, and San Sebastián in July. Indeed no white ibises at all were seen at the last-named station, an apparently ideal locality.

Although work was initiated at Lake Olomega on July 25, 1925, it was not until September 9 that the first white ibises put in an appearance. Whether these newcomers were migrants from the north or whether the movement represented a short inland migration from the coast is not known. At any rate they remained common at Lake Olomega until April 7 of the following year, and during the winter of 1925–1926 were abundant at Puerto del Triunfo and again were very numerous at Barra de Santiago in April, 1927. In all localities adults were vastly in excess of young; indeed the ratio was at least one hundred to one. This makes the supposition that breeding occurs anywhere in El Salvador extremely doubtful.

In the mangrove lagoons the ibises spent the low-tide intervals industriously probing the exposed flats, but when the water again

became too deep for wading they perched in company with curlews, turnstones, herons, and other mud gleaners on the mangrove roots just above high-water mark, passing the time until the next low water by alternately resting and preening. They were utterly oblivious to the fact that preening with a mud-smeared bill is not conducive to good appearance, for most of the adults seen were more or less stained from this habit. No effort was made to clean the bill. A bird was seen to fly directly from the mud to a mangrove knee and with blissful disregard of the fact that its bill was coated with black muck, commence to arrange the feathers of a once white plumage.

Colors of soft parts.—Adults: iris, bluish white; legs and feet, rosy flesh-color; skin of head, orange-red; bill, dull orange-red with terminal third olive.

Ajaia ajaia (Linnaeus). ROSEATE SPOONBILL. GARZA MORENA.

Platalea ajaja, Linnaeus, Syst. Nat., ed. 10, 1, 140, 1758—Brazil.

Specimens and records.—San Sebastián, 3; Lake Olomega, 1. Also noted at Rio San Miguel; Barra de Santiago; Lake Guija.

Status.—Present throughout the year on both fresh- and salt-water lagoons and marshes from sea level at least to 1,450 feet.

Remarks.—At no time were adults in breeding plumage discovered. Local hunters at Barra de Santiago assured us that spoonbills breed in some of the remote mangrove swamps in that vicinity, but only the usual pale-colored young of the previous year were seen by us in that locality in April, 1927.

Although nowhere very common, spoonbills usually could be found about any fair-sized marsh or river overflow in the lower country. At Rio San Miguel, in an area of forest which was covered knee-deep by overflow from the river, spoonbills were often seen perched about in trees, where their pink plumage rendered them very conspicuous against the dark green foliage. In more open marshes they frequently consorted with flocks of wood ibises, or paraded in long rows in the shallow water close to shore.

Order ANSERIFORMES. Screamers, Swans, Geese, and Ducks

Family ANATIDAE. Swans, Geese, and Ducks

Dendrocygna autumnalis autumnalis (Linnaeus). BLACK-BELLIED TREE DUCK. PICHÍ, PISHISHÍ.

Anas autumnalis Linnaeus, Syst. Nat., ed. 10, 1, p. 127, 1758—West Indies.

Specimens and records.—San Sebastián, 4; Lake Olomega, 6. Also noted at Colima; Hacienda Zapotitán; San Miguel; Puerto del Triunfo; Rio San Miguel.

Status.—Abundant resident of fresh-water lakes and marshes below 1,500 feet. Most numerous on the coastal plain, but apparently not common in salt-water localities.

Remarks.—The two localities in which the black-bellied tree duck was found in greatest numbers were the woods and marshes about Lake Olomega and the great swamps near the mouth of the Lempa. Elsewhere it was much less common and appeared chiefly as a wanderer. At Colima a pair was seen flying over the small marsh of the reservoir on January 21, 1927, but it is probable that they were simply stragglers which had followed the course of the Lempa to this point. The San Miguel record is that of a flock, probably lost in the storm, which flew about through the streets of the town during a heavy rain on the night of November 10, 1925. Two tree ducks were found on a brackish pool in the forest at Puerto del Triunfo on January 14, 1926, the only occasion when they were seen near the seacoast, and even in this instance they were not actually on salt water. These winter records are all undoubtedly those of casuals, for they were found but once in the localities mentioned.

It is not improbable that these ducks remain mated throughout the year, for singles were rarely seen, even in midwinter. Practically all of the smaller flocks were made up of pairs, and after a bird was shot its companion usually flew about the spot for some minutes after the rest of the flock has disappeared.

Tree ducks are very active at night, especially so when there is moonlight. In suitable localities flocks or pairs can be heard at almost any hour and their course followed by the continuous plaintive whistling. On August 28, 1925, at about four-thirty in the morning, several pairs were heard flying about in the swamp forest on the north shore of Lake Olomega, and by the aid of hunting lamps several of these were seen. It is probable that they had nests somewhere about. The largest flocks are to be seen in the spring before the nesting season. At one old grass-covered pond in the forest north of Lake Olomega hundreds were to be found at any time during the first half of April, 1926. The surface of this pond was overgrown with a mat of grass roots, which extended to a depth of several inches, and here and there old snags of water-killed trees provided good roosting places. Some of these trees

were crowded with tree ducks to the last available inch of space. Here they were perfectly safe from human molestation for beneath the green-carpeted surface of the bog were many feet of mud and water.

The eggs of this duck are persistently sought, since the young when hatched under domestic fowls are tame and are said to make little or no effort to join their wild relatives. However, they do not thrive and if not eaten in the meantime are said to live not more than a year or two. At any rate one or more birds were often seen about native huts, where they ran in and out with other two-legged and four-legged domestic animals and were so tame that they could be picked up and handled without protest.

Nesting.—The egg-laying season commences about the middle of July. Females killed at San Sebastián between July 15 and 27, 1912, were either laying or about to do so, as was one shot at Lake Olomega, August 19, 1925. A nest found at San Sebastián from which the female was flushed on July 25, was in the natural hollow of a thick foliated tree growing in several feet of water. The cavity was about two feet deep and one foot in diameter, nearly round and with the bottom covered with fine, soft chips, evidently pulled or picked from the walls. There was a fair amount of down present. This nest was promptly deserted. Many old sites, from which at one time or another eggs had been taken by the natives, were examined. Usually they were over three feet deep, and to get at the eggs large holes had been chopped out of the sides of the trunks, thereby ruining the nests for further occupancy. Some down is always present, according to Morales, who had taken many of their eggs. Downy young only a short time out of the nest were found at Lake Olomega on September 9, 1925. There were about a dozen in the brood, but they scattered into the marsh growth so rapidly and hid themselves so well that only one could be found.

Colors of soft parts.—Adults: iris, dark brown; tarsi and feet, pale flesh-color (♂) or bluish flesh-color (♀); eyering, pale blue; bill, dull, reddish flesh-color, dirty orange on basal one-half of ridge of culmen; nail on bill, pale blue. Small downy young; bill, slaty green; iris, nearly black.

***Cairina moschata* (Linnaeus). MUSCOVY DUCK. PATO REAL.**

Anas moschata Linnaeus, Syst. Nat., ed. 10, 1, p. 124, 1758—"India" (=Brazil).

Specimens and records.—Lake Olomega, 1; San Sebastián, 1; Colima, 1. Also noted at Hacienda Zapotitán; Lake Ilopango; Rio San Miguel; La Unión.

Status.—Fairly common resident of marshy areas and woods in the vicinity of the larger bodies of water. Noted from sea level to 2,500 feet, but at this latter altitude probably only transient. The centers of local abundance are in the marshy woodlands about Lake Olomega and Zapotitán.

Remarks.—The degenerate domestic varieties of the Muscovy duck fail utterly to convey an idea of the bird in its wild state. In its native environment of flooded forest it is as trim and graceful as a Canada goose, whether rising with powerful wing-beats from its feeding marsh or winnowing in and out among the trees. During the hotter parts of the day these ducks spend most of their time perched, in pairs or small flocks, on horizontal branches of large trees in the jungle, a location for which their sharp, curved claws are perfectly adapted. The great white shoulder patches, instead of blending in with the light and shade of the surroundings, stand out with startling clearness and often lead to discovery when otherwise the birds would have escaped notice. It is very difficult to steal into shotgun range of these birds, for they are always on the alert and generally fly away at the first suspicious sound or movement. In the early morning and late afternoon they feed in the nearby marshes and, since they habitually go to the same spots, may be shot easily from a blind.

Females usually are seen in company with an old drake at all times of the year, but there seem to be a great many unattached males which go about in small flocks numbering as many as seven or eight. Most of these flocking males are young birds with only partially developed shoulder patches, but very often adult males may be seen in such groups.

Muscovies were not found at Barra de Santiago nor at Puerto del Triunfo. In fact, with the exception of a single bird seen at La Unión, all our own records are for fresh water. The superintendent of the railroad repair shops at La Unión told us that he often shot this species about the bays and lagoons in the Gulf of Fonseca, so failure to record it from the two previously mentioned localities is not significant.

The eggs of this duck are much sought by the natives, for the young are easily reared and take kindly to domestication. Very few pure-blooded birds are to be seen in captivity, for they cross

readily with the imported, degenerate, white variety. At Lake Olomega these nondescripts frequently ranged to surrounding marshes in search of food and some of them, during our visit, came to an untimely end in consequence. Domesticated females are said to mate sometimes with wild drakes.

Nesting.—No occupied nests were found, but we were shown several dead stubs and also two living trees in the forest at Lake Olomega where eggs were said to have been taken from large natural cavities at some distance (up to 50 feet) from the ground. Females taken in January, February, and April were not breeding.

Querquedula discors (Linnaeus). BLUE-WINGED TEAL. ZARZETA.

Anas discors Linnaeus, Syst. Nat., ed. 12, 1, p. 205, 1766—South Carolina.

Specimens and records.—Puerto del Triunfo, 3 (January 14, 1926); Lake Olomega, 2 (February 3, 7; April 7, 1926). Also noted at Colima (January 25, 1927); Rio San Miguel (February 2, 1926).

Status.—Common midwinter visitant and abundant spring migrant on fresh-water lakes and ponds on the coastal plain and in the valley of the Lempa. The extreme dates of arrival and departure are January 14 and April 7.

Remarks.—Blue-winged teal apparently do not arrive in El Salvador until after the first of the year. Not one bird was seen until January 14, 1926, when a flock was found on a fresh-water jungle-pool of perhaps an acre in extent at the tip of the San Juan de Gozo Peninsula near the entrance to Triunfo Bay. Of the forty or more birds in this flock only about one-fourth were old males. Only a single bird, an adult male, was found in the extensive tule marsh at Colima during several days spent there in the latter part of January, 1927. Morales said that it is invariably some time after the first of January before these teal appear at Lake Olomega, a statement which bears some weight since he has lived and hunted there for several years.

Although generally distributed over fresh-water streams, ponds, and even in flooded forest, the great concentration point for these, as well as other migratory waterfowl, is Lake Olomega. In early February, 1926, there were flocks of hundreds and even thousands of blue-winged teal in the shallow water and marsh growth of the north shore and in the several streams entering this lake, and on April 7, of that year, although present in lesser numbers than during February, there were still swarms of birds present. On the later date it was noticeable that the flocks were, in the main, aggregations

of pairs. The young males were rapidly assuming the first nuptial plumage, which gave the flocks a more colorful appearance than in February when dull-colored birds were vastly in the majority. It was also noticeable that in April there was much rafting in open water and there were frequent purposeless flights from one part of the lake to another. Altogether, it was obvious that the teal were on the eve of the northward flight and probably would not have remained in the locality for many more days. Possibly these late flocks were, in the main, from farther south and had stopped off to rest before resuming their journey.

***Spatula clypeata* (Linnaeus). SHOVELER.**

Anas clypeata Linnaeus, Syst. Nat., ed. 10, 1, p. 124, 1758—Southern Sweden.

Specimens and records.—No specimens. Noted at Lake Olomega (February 3 and 7, 1926).

Status.—Detected only as uncommon, midwinter visitant on Lake Olomega.

Remarks.—On February 3, 1926, two old males accompanied by five females were seen flying along the lake shore and on the 7th several more small flocks, each containing one or more fully plumaged males, were noted. This latter date was the high-water mark in the numbers of nonresident ducks, and the shovelers possibly were transients from farther south rather than midwinter residents. No shovelers were noted in the same locality in early April.

***Nyroca affinis* (Eyton). LESSER SCAUP DUCK.**

Fuligula affinis Eyton, Mongr. Anat., p. 157, 1838—North America.

Specimens collected.—Lake Olomega, 2 (February 7, 1926); Lake Chanmico, 1 (May 24, 1912).

Status.—Uncommon midwinter visitant and spring migrant to lowland lakes.

Remarks.—Three small flocks of lesser scaups were seen flying along the shore of Lake Olomega on February 7, 1926. There were five or six birds to a flock, each of which contained only one adult male. It is possible that these birds were in transit, for they were not seen before nor after this date. The single bird taken at Lake Chanmico was solitary and was noticed for some days before it was shot. It appeared sickly, was never seen on the wing, and was in extremely abraded plumage. Probably it had dropped into this small lake from a migrating flock earlier in the year.

Order FALCONIFORMES. Birds of Prey

Family CATHARTIDAE. American Vultures

Cathartes aura aura (Linnaeus). MEXICAN TURKEY VULTURE.

Vultur aura Linnaeus, Syst. Nat., ed. 10, 1, p. 86, 1758—Vera Cruz, Mexico (as fixed by Nelson, 1905).

Specimens and records.—Divisadero, 1 (October 17, 1925). Also noted at every collecting station in El Salvador.

Status.—Common permanent resident of the foothills and mountains throughout the country, but comparatively rare on the coastal plain and in the vicinity of the larger towns.

Remarks.—The single turkey vulture collected, an adult male, is referable to the Mexican race and has a wing measurement of 490 mm. Two birds of unknown sex which were killed by a native on Volcán de San Miguel on March 12, 1926; both measured less than 500 mm., but since through oversight the exact measurements were not entered in the notes for that day, they cannot be given more definitely.

Although *aura* is the form which is permanently resident, the identity of the great migratory flocks of fall and spring is unknown, and it is possible that they represent another subspecies. The first of these flights was seen October 12, 1925, at Divisadero when about 50 turkey vultures were observed with 200 or more southward migrating hawks of several species. Comparatively small flocks passed daily or even several times a day, but the peak in numbers was attained on October 21. On that date the literally thousands upon thousands of hawks which took several hours to pass over Divisadero were accompanied by turkey vultures in singles, trios, small flocks, and one group of fully one hundred. It is pretty safe to say that more than one thousand turkey vultures passed on this date alone and a total of a good many hundreds previous to this time. Flights were seen almost daily until November 13, when the last migration of about one thousand individuals, mainly Swainson's hawks and turkey vultures in about equal proportion, was seen between Divisadero and San Miguel. The fact that the accompanying hawks, which were usually vastly in the majority, were such northern breeding forms as Swainson's, broad-winged, marsh, and sparrow hawks, certainly tends to create the suspicion that the turkey vultures were also northern birds. Unfortunately these flights passed too high in the air to allow any specimens to be taken, although many heavy charges of buckshot and much revolver ammunition was expended

in hopes of a lucky hit. Not only the identity, but the ultimate destination of these birds is a subject for conjecture. Carriker¹ evidently considers the Costa Rican population of turkey vultures to be nonfluctuating and resident. Wetmore, the latest reviser of the races of *Cathartes aura*,² apparently considers all (except *septrionalis*) to be essentially resident, and mentions no seasonal variation in numbers.

The return (northbound) migration reaches El Salvador about March 1, somewhat in advance of the hawks. On March 1, 1926, during the day, about 500 passed over on the summit of Volcán de Conchagua. On the 3rd, several small flights were also noted, none of them with accompanying hawks. On the 4th, large flocks mingled with several species of hawks, most of which were too high to be identified, were passing over at various times during the day, and on the 5th several more smaller flights were seen. At San José del Sacare on March 16, 1927, a band composed of three turkey vultures and seven broad-winged hawks was seen flying northeast in typical migratory flight.³

The resident population, which is stable in numbers throughout the year, is not by any means confined to the uplands, but is much more common there than on the coastal plain. This is just the reverse of what is true of the black vulture, which is much less common at higher altitudes than in the lower country. About the sea-coast at Barra de Santiago and Puerto del Triunfo we judged that there was about one turkey vulture to every hundred black vultures. At Los Esesmites the former were in the majority in a ratio of about 10 to 1.

As a competitor in the swarming clouds of black vultures about every town and village, the present species has absolutely no chance of survival, and very few are seen in such places. The center of abundance is in the country districts, particularly in the vicinity of cattle haciendas. Even on outlying cattle ranches there is usually a division of sorts, for the black vultures as a rule keep close to human habitations while *aura* works the open range.

Colors of soft parts.—Adult male: bill, ivory-white; tarsi and feet, flesh color with toes darker terminally; claws, dull black; head and cere, reddish flesh-color.

¹ Ann. Carnegie Mus., 6, p. 443, 1910.

² Bull. U. S. Nat. Mus., 133, pp. 88–91, 1926.

³ For more detailed notes of manner of flight, and other observations, see under *Buteo swainsoni*.

Coragyps atratus foetens (Lichtenstein). SOUTHERN BLACK VULTURE. ZOPE, ZOPILOTE.

Cathartes foelens Lichtenstein, Verz. Ausg. Saug. und Vog., p. 30, 1818—Paraguay.

Catharista atratus van Rossem (not *Vultur atratus* Meyer), Condor, 16, p. 11, January, 1914—Salvador.

Specimens and records.—Puerto del Triunfo, 1; Los Esesmites, 2. Also noted at every collecting station and intervening points.

Status.—Abundant resident throughout the country, with maximum concentrations in the vicinity of towns in the Arid Lower Tropical Zone.

Remarks.—The wing of a female, the only adult collected, measures 407 mm. This is smaller than the measurements recorded by Wetmore¹ for United States specimens, and we therefore follow him in recognizing, tentatively at least, a southern race. Carriker,² under the name of *Catharista urubu brasiliensis*, has already recorded the South American black vulture as occurring in Costa Rica, but on what authority is not clear since he lists no specimens. Peters³ has shown that *atratus* should be reinstated as the specific name of the black vulture.

So much has been written about the efficiency of the black vulture in the role of the world's most primitive garbage department that further remarks on the subject would be superfluous. We cannot, however, resist the temptation to nominate the species as a competitor for the title recently created by Robert Cushman Murphy and presented by him to the Peruvian cormorant, namely, "The Most Valuable Bird in the World."

Black vultures are infinitely more bold and aggressive than the less common turkey vultures, a fact which probably accounts in great measure for the disparity in numbers wherever the two species come into direct competition. The latter is a deliberate feeder and will not tolerate the scramble and fight that accompanies the descent of a group of zopilotes on any edible object. At Puerto del Triunfo it was the custom of the fishermen to kill the numerous small rays found each day in the fish traps by cutting off the tail and then spearing them with their own poisonous spines. These dead and half-dead rays which were left stranded on the mud flats when the

¹Bull. U. S. Nat. Mus., 133, p. 91, 1926.

²Ann. Carnegie Mus., 6, p. 442, 1910.

³Bull. Mus. Comp. Zool., 69, p. 415, October, 1929.

tide went down furnished considerable provender for carrion eaters, both avian and mammalian. The turkey vultures would approach slowly and nibble while the blacks gulped voraciously and fought in a welter of black mud and draggled feathers. When finished with the nearest rays they would gallop with half-raised wings to more distant ones, routing in an instant the timid turkey vultures which had been picking cautiously about the outer edges of the scattered banquet.

On the road between Divisadero and San Miguel a black vulture and a caracara were seen perched side by side on a horizontal branch of a large shade tree beside the road. These paid no attention to us since we were on horseback, and on coming under the tree we were astonished at seeing the zope carefully nibbling about the head and face of the caracara. It is very probable that it was engaged in picking off ticks, with which both species are plentifully infested, but at any rate the operation seemed to be enjoyed by both parties.

It is not necessary that the food of the black vulture be dead. Dying calves, which are regularly found on large cattle ranches, are usually set upon the moment they are too weak to move. The eyes are eaten first and then openings made on the thinner skinned parts of the body. At Rio San Miguel numbers of vultures were seen dashing into the smoke of a burning pasture looking for the scorched bodies of dead or half-dead mice, rabbits, and insects. In this case they were probably handicapped by a lack of grasping ability, but the incident is illustrative of the speed with which these birds come to every available food supply.

Only one natural enemy was observed. In early January, 1926, at Puerto del Triunfo, Stirton had shot a monkey (*Ateles*) which lodged in the crotch of a tall tree in the forest where it stayed for several days before being dislodged, probably by vultures. The usual assemblage, including one or two king vultures, hung about for several days pulling at the bones and scraps of skin on the ground, and one morning as we passed the spot a forest eagle (*Spizaetus ornatus vicarius*) flopped out from under a clump of huiscoyol palms on the opposite side of the trail. In the eagle's stomach were shreds of monkey skin and hair along with some fresh meat. The spot from which it had flushed was investigated, and the body of a freshly killed black vulture was found. The skin of the back had been torn off, and the kidneys and surrounding flesh eaten out.

It is not unlikely that certain birds, vultures in particular, are responsible in some degree for the spread of anthrax under certain

circumstances. In 1925, 1926, and 1927 this disease was very prevalent in parts of El Salvador, particularly in the Oriente. With rare exceptions there was no attempt made at disposing of the carcasses which remained where they dropped until picked clean. Even though the bacteria may fail to survive the passage through a vulture's digestive apparatus, the plumage and particularly the feet and bills may act as carriers. At Lake Olomega both king and black vultures after feeding on an animal which had died of anthrax retired to the trees and fence posts of a corral in which scores of cattle were penned nightly. At this place the burning of dead animals was sometimes attempted, but usually the "burning" consisted of piling on a little brush and small wood and roasting the exposed surfaces.

Nesting.—Egg laying commences in December and continues well into March. The first nest was found on Mt. Cacaguatique on December 17, 1925. On that date it contained one egg on which the parent was sitting, and on the 22nd it held the usual complement of two eggs. On Volcán de San Miguel large numbers nested among broken lava blocks in the beds of the numerous ravines, usually in groups or colonies. An inventory of one of these gullies on March 14, 1926, showed several pairs occupying sites where eggs had not as yet been laid, while others held fresh or incubated eggs, and in still others there were young in various stages of growth from newly hatched, downy chicks to full-grown birds which were ready for flight. No nests were discovered in the lowlands, where suitable nesting places are rare. Because of the many nests in hill and mountain districts where, as a rule, food is scarce, it seems likely that during the breeding season the birds do a certain amount of flying back and forth between hills and lowlands. In addition to the above mentioned localities, a single half-grown young was found in a bat cave at San Salvador on March 30, 1912, and a pair of newly hatched young were observed at Los Esesmites on March 4, 1927. Rock crannies and holes eroded in the lava ash and pumice are the usual locations for nests. It is probable that colonizing is simply the result of the proximity of favorable sites, for isolated caves often held evidence of former or present occupancy.

Colors of soft parts.—Adult female: iris, dark brown; tarsi, feet, head, and cere, blackish slate; bill, olive.

Sarcoramphus papa Linnaeus. KING VULTURE. REY DE ZOPILOTE.

Vultur papa Linnaeus, Syst. Nat., ed. 10, 1, p. 86, 1758—"India occidentalis" (=Surinam, Berlepsch, 1908).

Specimens and records.—Lake Olomega, 2; Colinas de Jucuarán, 2; Rio San Miguel, 4. Also noted at Volcán de Conchagua; Divisadero; Mt. Cacaguatique; Puerto del Triunfo.

Status.—Fairly common resident of the eastern departments. The center of abundance is the short coastal range lying between Puerto del Triunfo and the Bay of Fonseca and which comprises the Colinas de Jucuarán and Volcán de Conchagua (pl. XIII).

Remarks.—It is probable that the short, rocky stretch of coast range in the extreme southeastern portion of El Salvador is the actual home of most, if not all, the king vultures of the region. From these practically uninhabited hills they range out over the coastal plain, on which are situated most of the larger cattle establishments.

King vultures may be fairly common in a locality and still not be particularly noticeable. Although occasionally to be seen soaring at high altitudes they are essentially inhabitants of the forest and spend a great deal of time at rest in such cover. The first meeting with the species was on August 6, 1925, in a rocky, heavily wooded canyon just south of Lake Olomega and at the foot of the northern slope of the Colinas de Jucuarán. In a dry stream-bed a trap had been set for carnivores and baited with a dead monkey. Although carefully hidden in a cave, the bait was promptly discovered by a swarm of black and turkey vultures. Two days after the bones had been picked clean and all that remained were a few ill-smelling scraps of skin and hair, two adults and a young of the king vulture appeared on the scene. As we came near they flew up into the tall, overhanging trees where the young and one of the adults were shot. Three more, evidently another family party, were seen at the same place a few hours later. On August 17, at the summit of the Colinas, a pair which had been noticed circling in the air came almost at once to the skinned body of a small animal. This was apparently a mated pair, but in neither bird was there the slightest evidence of breeding. All through this month and until September 20 one or more of these strikingly colored birds was seen on every trip made to the summit of the Colinas. They were seldom observed soaring overhead, but from the hilltops we could look down on them circling about and just skimming the treetops of the jungle. On October 1, 1925, a solitary adult was seen circling with a swarm of zopes over the town of Divisadero. From November 20 to December 23, 1925, king vultures were often observed about some rocky cliffs near the summit of Mt. Cacaguatique. Their actions were not those of nesting birds, nor could any nesting site be located. It is probable they were, like the Divisadero

bird, wanderers from the Colinas de Jucuarán, which were only thirty miles away in an air line. At Puerto del Triunfo adults and young were frequently noted in the forest. The usual group consisted of two old birds and a single juvenile in the uniform blackish plumage. Here, just as formerly at Lake Olomega, they came to the bones and skin of a monkey carcass long after the meat had been effectually disposed of by their smaller relatives. King vultures were found to be common at Rio San Miguel, probably because at that place there is a large cattle ranch providing abundant food. Here on the evening of February 13, 1926, we dragged a calf's body out a mile or so from the ranch house and made several coyote sets. The traps were intentionally sprung early the next morning, and during the day the usual gathering of black vultures finished off most of the body. When at sundown we revisited the place to reset the traps a group of six king vultures was found there, including two adults, two two-year-old birds, and two black young. Many zopes were perched in the surrounding trees, but only the king vultures were at the few remaining scraps of food. The next evening there were two two-year-old birds, and two young, but no adults present. On Volcán de Conchagua from one to four were seen daily, at times including old and young or even as many as four adults together. At Lake Olomega, on April 9, 1926, two adults and a two-year-old appeared at an anthrax-killed beef carcass on which about 50 black vultures had been working for some hours previously. These three gorged themselves from midafternoon to dusk, following which they roosted in a tall tree in a corral directly in front of the house and finally flew out of sight when, at dark, a herd of cattle was turned into the enclosure. In most instances it was the black vultures who first discovered the food, and the bigger species never put in its appearance until several hours or even days later, at a time when most of the black vultures were sitting about, gorged to the bursting point. It appears that the king vultures are not very quick to find food and that as a rule they are guided to it by the sight of dozens of surfeited black vultures perched conspicuously in the nearby trees, although once they do arrive there is no doubt that the smaller species keep their distance. It also seems usual for the young to accompany their parents for at least two years. One young appears to be the normal number.

Plumage notes.—There are four distinct stages of plumage, so that maturity is not attained for some years. The first stage is that usually described as the juvenal, that is, uniform, sooty black with

a varying amount of concealed white on the underparts. In the next, or second-year stage, the entire underparts (including the wing coverts) are white except for the blackish ruff. A bird which Jorge Meléndez kept in captivity at his hacienda near San Salvador changed to this plumage when one year old. In the third stage, of which no specimens were taken but which was frequently seen, the shoulders are cream-colored like those of the adult, but the interscapular region and back are dark as in younger birds. Adults were going through the annual molt in August.

Colors of soft parts.—Juveniles: iris, dark brown; bill, black tinged terminally with dark red; head, neck, and rudimentary wattle, dull black; collar (under ruff), dull orange; tarsi and feet, dull yellowish-orange; claws, black. Second-year stage: iris, brownish white; bill, dull orange-red, blackish at base; cere and wattle (which is larger than in juveniles), mottled with orange and black; head, dull black mottled with orange on foreneck and with pink on throat and hindneck; tarsi and feet, mottled dull yellow and black. Adults (sexes exactly alike): iris, ivory white; bill, orange-red, black at base; cere, orange-yellow; sides of neck, center of crown, eyelids, and corrugated portions of head, orange-red; unbristled parts of chin, throat, malar region, and hindneck, wine color; tarsi, feet, and claws, black, the scales contrasting strongly with the paler interspaces.

Family ACCIPTRIDAE. Kites, Hawks, and Allies

***Odontorhynchus palliatus* (Temminck). BRAZILIAN KITE.**

Falco palliatus "P. Max.," Temminck, Pl. Col., livr. 23, pl. 204, 1822—"Bresil" (=Rio Peruhypé near Villa Vicoza, Brazil; fide Griscom, 1932).

Specimens collected.—Lake Olomega, 2 (August 15 and 28, 1925); Rio San Miguel, 2 (February 1 and 10, 1926); Barra de Santiago, 1 (April 3, 1927); Hacienda Zapotitán, 1 (June 10, 1912).

Status.—Uncommon, but generally distributed resident of marshy areas in the Arid Lower Tropical Zone.

Remarks.—The Brazilian kite is a heavy, sluggish species which as a rule was found only in rather dense jungle in the immediate vicinity of water. It was invariably quite indifferent to human presence and could be approached without caution to within 50 feet or less. Even when frightened into flight none of those encountered flew for more than a few yards to the next convenient horizontal branch. The six specimens collected were all the individuals of this species met with in the twenty-three months spent in the field, but this apparent scarcity may be accounted for, in part, by the fact that

their sluggish habits render them easily overlooked. However, according to Carriker and the authors of the "Aves" section of the *Biologia Centrali-Americana*, they are never very common anywhere, even though widely distributed in a geographical sense. The juvenile was the only one of the six collected which was on the wing when first noticed, and it may safely be said that this is one of the most sedentary of kites.

Nesting. A juvenal female in fresh, unabraded plumage and obviously out of the nest but a short time was taken at Lake Olomega on August 15, 1925. This indicates a midsummer nesting.

Plumage notes. No specimens remotely resembling the plumage described as "juv." by Carriker¹ and by Salvin and Godman² were collected or seen. There may be two color phases in the young of this species, to the darker of which the descriptions of the above authors may apply. At any rate the Salvin and Godman description of a stage (or phase) which they designate as "Junior" applies without question to the Lake Olomega juvenile, concerning the age of which there can be no uncertainty. A more detailed description than is given in the *Biologia* follows.

Fully grown juvenal female in fresh plumage and with bones of skull and body still soft: dorsally, brownish black with all wing coverts, interscapular region, rump and upper tail coverts narrowly edged with fulvous; wings, brownish black, the pattern as in adults, and all remiges broadly tipped with fulvous; crown, occiput, and postocular streak, black; forehead (broadly), superciliary stripe, malar region, auriculars, and collar around nape, creamy white thickly streaked with black except on forehead and nape where the black is reduced to fine shaft streaks; entire underparts, including under wing coverts and axillars, white, more creamy posteriorly and relieved only by a narrow line of dark brown shaft streaks down center of chin and throat; tail, similar to adult, but tip appearing as a broad, brown bar with buffy white, terminal edging and remaining bars mottled with grayish brown; facial skin, cere, maxillary and mandibular rami, gape, tarsi and feet, orange-yellow; iris, yellowish olive; claws and bill, black.

Next in order to the juvenile come a male and female taken, respectively, at Barra de Santiago, April 3, 1927, and Hacienda Zapotitán, June 3, 1912. These have the clear, slaty dorsal coloration of adults, but they are immaculate white below and the feet are

¹ Ann. Carnegie Mus., 6, p. 448, 1910.

² Biol. Centr.-Am., Aves, 3, p. 101, 1901.

intermediate between the yellow of the juvenile and the lead blue of the adults. This is probably the stage described by Swann as the adult for he gives the color of the feet as "yellow." The iris of the female taken June 3 was listed in the notes of the day as "red." Salvin and Godman give the color of the *adult* iris as "brunnea," which in our birds it certainly was not. The evidence at hand shows a red or brown iris as the intermediate stage between the yellowish olive of juvenility and the dark blue-gray or black of maturity.

The three fully adult females (no fully adult males collected) have the entire underparts, particularly on the pectoral region, tinged with delicate pearl gray and the tibial plumes strongly mottled with slaty black. Salvin and Godman long ago described the adults of this species as having maculated tibial plumes and blue feet, but these particulars seem lately to have been overlooked. The colors of the soft parts are very different from those of the young and are as follows: iris, dark blue-gray or nearly blue-black; cere (superior to nostrils), bill and claws, black; facial skin, cere (below line of nostrils), edge of gape, mandibular and maxillary rami, tarsi, and feet, blue-gray or gray-blue.

Colors of soft parts.—See antea.

Stomach contents.—"Insects," 1; large wasp larvae, 1. The eating of wasp larvae is not confined to this species (see *Hypomorphnus* and *Buteogallus*), but the method of securing them is a mystery. It would seem that any ordinary assault on a nest full of inch-long wasps would almost certainly result in death to the hawks.

Chondrohierax uncinatus uncinatus (Temminck). HOOK-BILLED KITE.

Falco uncinatus "Illiger," Temminck, Pl. Col., livr. 18, pls. 103, 104, 115, 1822—Rio de Janeiro, Brazil.

Chondrohierax uncinatus uncinatus Friedmann, Journ. Wash. Acad. Sci., 24, p. 317, July 15, 1934—Salvador.

Specimens collected.—Lake Olomega, 2 (August 13, September 10, 1925); Volcán de Santa Ana, 1 (May 7, 1927).

Status.—Rare in summer (possibly resident) in heavily wooded areas of the coast range and coastal plain. The vertical range is from 200 to 5,000 feet.

Remarks.—At Lake Olomega at least two pairs of hook-billed kites occupied groves of gigantic wild fig trees in boggy areas near the lake shore. Although frequently heard, it was only rarely that they were actually seen, for they perched high up in the foliage and

if startled into flight by gunshots departed over the treetops. On September 10, 1925, the adult male of one of the pairs objected strenuously to the presence of a Mexican black hawk in the grove, and in the ensuing flurry both birds left the jungle and were shot at the edge of a nearby cornfield. The surviving member of the pair was seen squabbling with another Mexican black hawk on September 12, but neither was taken. The juvenile was found in a rocky, waterless cañon near the lake, but its stomach contents showed that it had recently been near water. The third bird, an adult, was taken at nearly 5,000 feet altitude in the dripping wet forest of the Humid Upper Tropical Zone on Volcán de Santa Ana. It flew up from the forest floor and was killed as it started off through the trees.

Hawks are certainly not noted for their musical ability, but this species has a very musical whistle which very much resembles three notes of an oriole's song. This whistle was heard many times coming from the highest foliage in a grove of giant *Ficus* and for some days, before the identity of the "songster" was finally determined, search actually was made for an unfamiliar species of oriole. These notes are given when the bird is at rest in the treetops. When it is engaged in harrying the black hawks, only harsh chattering and screaming is heard—calls which are certainly less musical, but far more in keeping with family traditions.

Plumage notes. The two older birds are in what is evidently the normal, light phase, adult male, plumage, that is, with slaty upperparts, head and throat, and with underparts prominently barred with slaty brown and ochraceous. Swann¹ (incorrectly) considers barring a sign of immaturity. The fully grown juvenile collected is in the uniform sooty black phase with the feathers of the whole of the contour plumage barred with concealed black and white for the basal two-thirds. The wings and tail of this juvenile are patterned as in the adults, but the light markings and bars are nearly pure white, thus throwing them into doubly strong contrast. The barred bird (subadult?) taken September 10 is in molt. Such wing quills as remain of the old plumage are mottled with rufous while the new ones are uniform slate. The new feathers of the underparts are similar to those which are being lost; that is, they are prominently barred. According to Sharpe,² Salvin and Godman, and Swann the absence of the nuchal collar, accompanied by slate-gray upperparts is the unfailing badge of full maturity. However,

¹ Syn. Accipitres, 2d ed., p. 157, 1922.

² Cat. Birds Brit. Mus., 1, p. 330, 1874.

Friedmann (sup. cit.) has apparently straightened out the complications of sex, age, phase, and geographic variation to which the species is subject.

Colors of soft parts.—Adult male: iris, white; mandible, pale yellow-green with tomia dusky; cere, gape, and entire facial area (except as below), greenish yellow; eyering and bristled loreal streak, pea-green; supra-loreal skin, bright yellow; tarsi and feet, orange; maxilla and claws, black. Full grown, melanistic juvenal male: iris, brown; entire facial area, cere, mandibular rami, tarsi and feet, yellow; claws and bill, black.

Stomach contents.—Empty, 2; unidentifiable small batrachian, 1.

Harpagus bidentatus fasciatus. LAWRENCE'S DOUBLE-TOOTHED KITE.

Harpagus fasciatus Lawrence, Proc. Acad. Nat. Sci. Phila., p. 429, 1868
Guatemala.

Specimen collected.—Volcán de Conchagua, 1 (March 5, 1926).

Status.—Uncertain. Detected only in spring at the upper limits of the Arid Lower Tropical Zone.

Remarks.—A darker-colored bird seen in the same locality and on the same date as the specimen taken was seemingly also of this species. The bird collected, a subadult male in nonbreeding condition, was shot in the coffee cover in a steep ravine near some natural underbrush. The altitude was 3,000 feet and thus practically at the upper limit of the Arid Lower Tropical Zone in this locality. The stomach and crop contained reptile scales, grasshoppers, and beetle remains.

Colors of soft parts.—Iris, dull orange-red; cere and edge of gape, light olive-green; maxilla, dull black, bluish at extreme base below cere; mandible, greenish horn, tip dusky; tarsi and feet, orange-yellow; claws, black.

Ictinia plumbea (Gmelin). LEAD KITE. GAVILÁN PALOMERO.

Falco plumbeus Gmelin, Syst. Nat., 1, p. 283, 1788—Cayenne.

Specimens and records.—San Sebastián, 5 (July 15 to 25, 1912); Barra de Santiago, 4 (April 4, 6, 13, 1927). Also noted at Volcán de Conchagua (February 26 and March 1, 1926).

Status.—Common summer visitant to the mangrove association along the coast. The earliest arrivals were noted February 26. The date of departure from El Salvador after the breeding season is

unknown, but Salvin and Godman record the species from Guatemala in "November."

Remarks. We are unable to recognize as distinct from South American birds the Central American race named as *Ictinia plumbea vagans* by Miller and Griscom.¹ The only character given in the original description is that of the supposed larger size of the northern race (wing 300 to 319 in the males and 292 to 316 in the females), and this proves to be far from constant. The six adult El Salvador males vary in size as follows: wing, 283-308 (average 299); tail, 129-140 (average 135.5). It will be noted that the shortest wing measurement (283) is, with one exception, smaller than any recorded by the describers of *vagans* for typical *plumbea* from South America. Swann² has already questioned the validity of *vagans*.

Although the lead kite is reported on good authority³ to breed in the pine districts of central Guatemala, it is not found beyond the mangroves of the seacoast in El Salvador, except as a migrant. During the latter part of December, 1925, and in the month of January, 1926, no trace of this species was found at Puerto del Triunfo. The first northbound migration to be noted was a flock of twenty which passed over the summit of Volcán de Conchagua on February 26, 1926, and on March 1, in the same locality, several smaller flocks were seen. In all of these the white tail-bands were easily seen, and it is hardly possible that any *Ictinia mississippiensis* could have been present. Between March 31 and April 13, 1927, *Ictinia plumbea* was found to be common at Barra de Santiago. The population there averaged about one pair to the linear mile along the mangrove-bordered tide channels. At San Sebastián in July, 1912, the nesting season was over and small flocks of five or six birds were much in evidence, although many single birds and pairs were also noticed. The flight of this species is extremely light and graceful, and the birds often indulge in aerial gymnastics, seemingly for pleasure. Ordinarily this kite is quite shy and not at all easy to shoot, but about the nesting grounds it usually dives and circles close to the intruder.

Nesting.--Nest building probably commences soon after the birds arrive from the south, for a half-completed nest was found in a mangrove at the edge of the lagoon at Barra de Santiago on April 4.

¹ Am. Mus. Novit., 25, p. 5, Dec. 9, 1921.

² Syn. Accipitres, errata following p. 233, 1922.

³ Salvin, Ibis, p. 146, 1861.

This nest was a collection of rather coarse twigs and was placed in an upright triple crotch about 40 feet above the water. It was in plain view from all sides. Another nest was found on April 13, 1927, about a mile from the place where the first one was discovered and in a precisely similar situation thirty-five feet above the water. The construction was also similar, in other words the base of the nest was made of coarse twigs about the diameter of a lead pencil and the lining was of much smaller twigs. The type of nest was very similar to that of a small heron, and but little care was exercised in its building. The nest contained a single egg, in which incubation had commenced, and dissection of the female showed that this constituted the full set. Both parents were present at the nest. The egg, white with a bluish tinge so faint as to be almost imperceptible, measures 42.5×31.5 . The nesting time probably varies with different pairs, for a juvenile, full grown but still being fed by the parents, was collected at San Sebastián, July 22, 1912.

Colors of soft parts.—Adults: iris, dark crimson; bill, cere, and claws, black; tarsi and feet, reddish orange.

***Accipiter striatus velox* (Wilson). SHARP-SHINNED HAWK.**

Falco velox Wilson, Amer. Orn., 5, p. 116, pl. 45, fig 1, 1812—Banks of Schuylkill River (near Philadelphia, Pa.).

Specimens collected.—Puerto del Triunfo, 1 (January 21, 1926); Rio San Miguel, 1 (February 5, 1926); San Salvador, 2 (March 13, April 25, 1912).

Status.—Uncommon midwinter visitant to the Arid Lower Tropical Zone. Remains until late in spring, but probably does not breed.

Remarks.—Besides the four specimens listed above, another was seen at Puerto del Triunfo, January 21, 1926, and one at San Salvador, April 25, 1912. These six records are all that were noted during three winters' work in El Salvador. All of those taken were adults.

During their winter residence in the country sharp-shins are invariably to be found near water, probably because small birds are more common in the low growth along streams and overflow.

***Accipiter erythronemius chionogaster* (Kaup). WHITE-BELLIED SHARP-SHINNED HAWK.**

Nisus (Accipiter) chionogaster Kaup. Proc. Zool. Soc. Lond., 19, p. 41, 1851—Coban, Guatemala.

Specimens collected. Los Esesmiles, 1 (February 6, 1927); San José del Sacare, 1 (March 18, 1927).

Status. Rare in midwinter and spring (probably resident) in the Arid Upper Tropical Zone of the cordillera.

Remarks. This beautiful little hawk was met with on but three occasions. The specimen taken on Los Esesmiles was the only one seen in that locality and was shot at the edge of the cloud forest at an altitude of 7,500 feet. At San José del Sacare a pair frequented the pines and oaks on a ridge just west of the town and many attempts were made to collect them. The male was finally taken as it was splashing about in shallow water at the edge of a rocky stream, but the female, although she was frequently seen circling over the pine ridges, never came near enough for a shot.

In flight and habits this species appears to be a duplicate of the northern sharp-shinned hawk and, observing the external structural similarity, one is tempted to suspect recent specific identity. Size, proportions, wing formula, and the wing and tail pattern are practically identical in both; in fact the only structural differences observable are the very slightly larger bill and slightly longer middle toe of *chionogaster*. It is possible that the two species represent accomplished phase segregation.

Nesting. The male taken on March 18 was either breeding or about to do so.

Colors of soft parts. -Adult male: iris, blood-red; cere, olive-green; bill, blackish horn-color terminally, bluish next to cere; eyelids, olive-green; tarsi and feet, bright yellow; claws, black.

Stomach contents. Small bird (sp.), 1.

***Buteo jamaicensis costaricensis* Ridgway. CENTRAL AMERICAN RED-TAILED HAWK. GAVILÁN (all large hawks).**

Buteo borealis, var. *costaricensis* Ridgway, in Baird, Brewer, and Ridgway, Hist. No. Am. Birds, 3, p. 285, note, 1874—Costa Rica.

Specimens and records. Mt. Cacagualique, 2 (December 12, 14, 1925); Volcán de San Miguel, 1 (March 20, 1926); Los Esesmiles, 1 (February 15, 1927). Also noted at San Salvador (March 12, 1912); Volcán de San Salvador (June 2, 1912); Divisadero (March 31, 1926); San José del Sacare (March 16, 1927).

Status.—Resident throughout the year in the foothills and mountains. Although observed between the altitudes of 800 and 8,500 feet it is obvious that the metropolis of the species is the oak and pine regions of the Arid Upper Tropical Zone.

Remarks.—The four specimens collected are characterized by dark, relatively uniform upperparts and sides of head and neck, and by sparsely marked, nearly white underparts with almost immaculate, reddish ochraceous thighs. They are somewhat smaller than *B. j. calurus* in wing and tail measurements, but have larger tarsi and feet. In a large series of *calurus* in the Dickey collection, selected over a period of years to show every possible color variation, there are no examples having the combination of dark upperparts and head with light-colored underparts, such as are shown by the four El Salvador skins of *costaricensis*. All four of these birds are adult and, while showing some variation among themselves, are essentially of the same type. Their measurements are as follows:

	Wing	Tail	Tarsus
2 adult males	360-372	185-200	86-88
2 adult females	385-395	198-210	88-89

Besides the birds collected, several others showing the same type of coloration were seen at various times and places which are listed above. However, the species is by no means common in El Salvador. On Mt. Cacaguetique there were two resident pairs in the oaks, one pair to each of the two main ridges in the vicinity of camp. One of these pairs included in its hunting territory a weed-grown cornfield, and both of these birds were finally collected. The other pair stayed high up on the mountain side at all times. On Los Esesmiles there were likewise two pairs within a relatively limited area, both of which had their headquarters in the humid cloud forest, but which nevertheless usually hunted over the more open pine and oak slopes on the arid side of the mountain.

It is more than likely that still another race of this hawk occurs in El Salvador as a migrant, for most of the hawk flights seen in the fall contained a heavy sprinkling of red-tails. The Divisadero flights of October 12 and 15, 1925, were especially notable in this respect, and several birds which temporarily dropped out to beat back and forth along a cleared hillside were certainly much paler-colored than the resident pairs previously enumerated. Therefore it may well be that the western red-tail (*B. j. calurus*) will be found to be a migrant in El Salvador, since it is already known from Guatemala and Nicaragua.

Nesting.—On March 1, 1927 a nest, from which young could be heard calling, was found at an altitude of 8,500 feet in the cloud forest on Los Esesmiles. The site was an enormous oak and the nest was absolutely inaccessible by the means at hand.

Colors of soft parts. Adults: bill, black, bluish on basal half of mandible and next to cere; cere and edge of gape, waxy, greenish yellow; iris, brown; tarsi and feet, bright yellow; claws, black.

Stomach contents. Reptile scales, 1.

Buteo platypterus platypterus (Vieillot). BROAD-WINGED HAWK.

Sparvus platypterus Vieillot, Tabl Ency Méth, 3, p 1273, 1823- Philadelphia, Pennsylvania.

Specimens and records.- Mt. Cacagualique, 4 (November 26 to December 14, 1925); Volcán de Conchagua, 1 (February 27, 1926); San José del Sacare, 1 (March 16, 1927). Also noted at Divisadero (October 12, 1925).

Status. Common fall and spring migrant and less commonly a winter visitant in the foothills and mountains between 2,000 and 4,000 feet altitude.

Remarks. The first broad-wings to be noted were a few scattered individuals seen with a flight of Swainson's and red-tailed hawks and turkey vultures which passed over Divisadero on October 12, 1925. Most of the flights observed after that date and until November 6 also contained a greater or lesser number of this species.

A fair number of broad-wings were found wintering on Mt. Cacagualique, for besides the four specimens taken in that locality about a dozen others were seen at various times. They were in most cases found in the trees along mountain streams, perched in places which afforded an outlook over a good-sized area of shrubbery and undergrowth. The single specimen taken on Volcán de Conchagua was shot in a rocky canon near one of the few water holes on that mountain.

The only date on which broad-wings were noted in spring was March 16, 1927, at San José del Sacare. At this time two, one of which was collected were found in the oaks bordering a small stream, and a small flock of seven, accompanied by three turkey vultures, was seen flying in a northwesterly direction.

Colors of soft parts. Adults: iris, pale brown, light brown or creamy white with a brownish tinge; cere and edge of gape, greenish yellow; bill, black with basal half of mandible bluish; tarsi and feet, bright, waxy yellow; claws, black. Bird of the year: similar, but tarsi and feet dull yellow.

Stomach contents.- *Momotus lessonii*, 1; unidentifiable birds, 2; grasshoppers and large beetles, 1.

Buteo magnirostris direptor (Peters and Griscom). GUATEMALA
BROAD-WINGED HAWK.

Rupornis magnirostris direptor Peters and Griscom, Proc. New Eng. Zool. Club, 11, p. 46, Aug. 30, 1929—Finca El Cipres, Mazatenango, Guatemala, *ibid.*—"Zapatitlan," Salvador.

Buteo magnirostris direptor Peters, Check-list Bds. World, 1, p. 237, 1931—Salvador.

Rupornis ruficauda Salvin and Godman (not *Asturina ruficauda* Sclater and Salvin), Biol. Centr.-Am., Aves, 3, p. 76, 1900—part, La Libertad.

Specimens and records.—Lake Olomega, 11; Rio San Miguel, 5; Rio Goascorán, 1, Puerto del Triunfo, 3; Divisadero, 4; San Sebastián, 2; Barra de Santiago, 1; Hacienda Zapotitán, 2; Lake Guija, 1; Sonsonate, 1. Recorded from La Libertad; Zapotitán.

Status.—Common and at times an almost abundant resident below 1,500 feet. The center of abundance is on the coastal plain.

Remarks.—The Central American race of *Buteo magnirostris* is easily differentiated from *B. m. griseocauda* of southeastern Mexico and *B. m. petulans*¹ of Panama. In tail characters it is intermediate between the two, for the gray interspaces on the tail are strongly tinged with rufous next to the darker bars. The lower parts are intermediate between the heavily flammulated *griseocauda* and the uniformly gray-chested *petulans*, but in this latter respect *direptor* is extremely variable. On the pectoral area the color ranges in birds from the same locality from pale, nearly uniform, brownish gray to light rufous, heavily mottled with brown. Another item of interest as showing the truly remarkable variation to which *direptor* is subject may appropriately be introduced here, namely that this race occasionally, when fully adult, wears a plumage scarcely or not at all distinguishable from that of the normal juvenile. This condition has previously been supposed to be confined to the Cozumel Island race *B. m. gracilis*.

The vernacular name of "Large-billed Hawk," based of course on the unfortunately chosen specific name, *magnirostris*, is so misleading that we suggest "Broad-winged" as a substitute. This species is very closely related to *Buteo platypterus*.

In the forests and semiwooded areas below 1,500 feet and particularly in the vicinity of water, this is by far the commonest of the resident hawks. The call-notes, flight, and general habits very closely resemble those of the closely allied species *Buteo plagiatus*

¹ Substitute name for *ruficauda* Sclater and Salvin; see van Rossem, Condor, 37, p. 215, July, 1935.

micrus, with which it occurs in most localities in the lowlands. It is the easiest of all local hawks to decoy and will usually come at once to an imitation of the cries of a wounded bird. Even more than *micrus* the present species is given to screaming shrilly at people walking through the woods and, indeed, it seldom shows any fear of man.

As a persistent follower of brush and grass fires this hawk has few equals and follows closely behind the fire line to feed on the dead and dying multitudes of insects, small reptiles, and similar creatures which have been scorched or killed by the blaze. In this pursuit the flight feathers, coming into momentary contact with the hot ashes, often get severely scorched and the charred portions soon drop off, leaving little or no clue to the cause of the loss. Although the tail feathers are by far the most likely to suffer, other feathers as the wing quills and those on the underparts of the body sometimes get badly singed also. One bird, taken at Lake Olomega, had portions of the body plumage and most of the wing feathers ruined in this manner, so much so that the outer primaries were reduced to mere stubs. The extraordinary amount of abrasion which was noted by Peters and Griscom and for which they could not account is thus, in part at least, explained.

Nesting. Oddly enough no nests of this species were found, although it must be confessed that no real search was made for them. Juveniles, only recently on the wing, were taken in June, July, and August so it appears likely that *direptor* is a spring breeder like most of the other local hawks.

Plumage notes. The juvenal plumage is normally worn for a full year and is changed by a complete molt into the adult livery in the second fall. The time of the annual molt is in August and September in most cases, but may be initiated in the latter part of July. In some young birds there is a partial spring body molt in which the new feathers resemble those of the adult plumage, a condition common to many other species of hawks. One female, taken at Lake Olomega on September 25, 1925, presents a very unusual condition, for although at least two years old she had never assumed the normal type of adult plumage. The new body plumage was practically complete, but it is indistinguishable from that of the normal juvenile. The old flight feathers of the wings and tail are those of the normal adult just as are those of the new (incoming) ones. Dissection showed that she had laid the previous spring, so this condition cannot be due to any abnormal condition of the ovary. The color of the iris was also that of the juvenile.

Colors of soft parts.—Adults: iris, bright lemon-yellow; cere, edge of gape, tarsi, and feet, waxy lemon-yellow, varying to orange-yellow; bill, black, usually plumbeous toward base; claws, black. Juveniles: similar to adults, but iris orange-brown when very young and lightening gradually to orange-yellow when about eight or nine months of age (January); tarsi, feet, cere, etc., duller and more greenish than in adults.

Stomach contents.—Small frogs, 2; crickets, 1; small salamanders, 2; grasshoppers, 3; lizard, beetles, and feathers, 1; grasshoppers and caterpillars, 1; lizards and grasshoppers, 1; large beetles, 1; small garter snake, 1. At Puerto del Triunfo one of these hawks was seen to snatch a blue honey creeper from a feeding flock.

***Buteo¹ plagiatus micrus* (Miller and Griscom). SOUTHERN GRAY HAWK.**

Asturina plagiata micrus Miller and Griscom, Am. Mus. Novit., 25, p. 4, Dec. 7, 1921—Four miles northeast of Chinandega, Nicaragua; van Rossem, Condor, 32, p. 303, November, 1930—Salvador (crit.).

Asturina plagiata Salvin and Godman (not of Schlegel), Biol. Centr.-Am., Aves, 3, p. 74, 1900—part, Acajutla; La Libertad.

Asturina plagiata plagiata Peters, Bull. Mus. Comp. Zool., 69, p. 416, Oct., 1929—Salvador (crit.).

Specimens and records.—Lake Olomega, 5; Puerto del Triunfo, 4; Rio San Miguel, 2; Volcán de San Miguel, 1; Divisadero, 1; Lake Channico, 5; Sonsonate, 2; Hacienda Zapotitlán, 1; Lake Guija, 1. Also noted at San Salvador; Volcán de San Salvador; San Sebastián; Rio Goascorán; Colima; Barra de Santiago. Recorded from Acajutla; La Libertad.

Status.—Common and generally distributed resident throughout the Arid Lower Tropical Zone, straggling after the breeding season to 4,500 feet in the Arid Upper Tropical Zone.

Remarks.—The series of gray hawks collected are, as would be expected, referable to the Nicaraguan race and are indistinguishable from four specimens from that country which have been borrowed from the American Museum of Natural History. In none of them is there more than one complete, white tail-bar, the second being either broken up or, in some cases, altogether wanting. The measurements are as follows:

	Wing	Tail
6 adult males.....	235.0-247.0	142.0-155.5
5 adult females.....	261.0-277.0	162.0-168.0

¹ Reasons for including *Asturina* in the genus *Buteo* are advanced by van Rossem, Bull. Mus. Comp. Zool., 77, p. 429, Dec., 1934.

It will be noticed that while the wing measurements agree very closely with those given by the describers of *micrus*, the tail measurements are about 50 millimeters shorter. This is most probably due to the use of a different system of tail measurement, since the four Nicaraguan birds borrowed from the American Museum differ in no way from the measurements given above. Young birds have decidedly longer tails than adults.

The southern gray hawk is a common species everywhere in the lower levels and is one not easily overlooked. While it prefers open fields dotted with isolated clumps of trees, it is by no means averse to second-growth woodland, and at Barra de Santiago and Puerto del Triunfo was even found in deep forest. Like some of the other resident hawks this species is remarkably tame and, especially after a meal, is loath to leave its perch. Like the Guatemala broad-winged hawk, this species has the habit of screaming loudly and often at any unfamiliar visitor, a custom which very often attracts attention when otherwise the bird might have been unnoticed. Most individuals would permit an approach to within twenty-five yards. Although noisy throughout the year, these hawks are especially so in the early spring just before the nesting season when, with alternate intervals of quick wing beats and sailing, they fly in short circles above their nest grove. In this they remind one of *Buteo lineatus*. Possibly they remain mated throughout the year, for adults are invariably found in pairs.

Nesting. The nesting season is in March or April, for young not able to fly were taken at Lake Chamnico at various dates in late May. At Zapotitán in June and early July several broods, evidently only recently on the wing, were being fed by their parents.

Plumage notes. The juvenal plumage is ordinarily worn a full year, but in those few individuals which breed the first year there is a partial body molt in which, in February and March, a few gray, adult feathers make their appearance. There is a limited, prenuptial body molt in the adults also. The annual molt occurs in July and August as shown by several examples taken between July 16 and August 17.

Colors of soft parts. Adults: iris, brown; bill and claws, black; cere, edge of gape, tarsi and feet, bright, waxy yellow. Juveniles: similar, but bill bluish at base and cere and edge of gape, dull, greenish yellow.

Stomach contents.—Mouse, 3; small lizards, 2; feathers (sp.), 2. The bird taken on Volcán de San Miguel was shot as it was trying to carry off a white hen from the dooryard of the ranch house.

***Buteo swainsoni* Bonaparte.** SWAINSON'S HAWK. ASAQUANE (all migratory hawks).

Buteo swainsoni Bonaparte, Geog. and Comp. List, p. 3, 1838 near the Columbia River (=Fort Vancouver, Washington).

Specimens and records.—No specimens. Noted at Divisadero (October 12 to November 6, 1925); Volcán de San Salvador (April 30, 1927).

Status.—Abundant spring and fall migrant through the lowlands.

Remarks.—Small companies of southbound hawks had been noted for about two weeks before October 12, but at such heights or so far away that their identity was uncertain. It is probable that some of them were Swainson's hawks. On October 12 the first low-flying flock of migrating hawks passed directly over Divisadero. They were seen approaching while still some distance away, allowing just time for us to gain the summit of the hill over which they were flying. The lowest birds were about 500 feet above the hilltop, low enough for certain identification, but too high to secure specimens. In this flight were about two hundred individuals, of which all but about a dozen red-tails, possibly twice that number of broad-wings, and about fifty turkey vultures, were *Buteo swainsoni*. Every phase of plumage was represented, but the light type predominated. No young of the year, which were identifiable as such, were in this flight, nor were any seen until November 4, when a great many were noted in a large flock of about one thousand birds. Another small flock of about two hundred was noted on October 15. In this, as in fact in most fall flights, Swainson's hawks greatly predominated, but with them there were also some red-tails, turkey vultures, and a few marsh hawks. Two single, adult Swainson's hawks of the light type were seen hunting over the mimosa scrub on October 17, and the assumption is that they had dropped out of some flock for the purpose of feeding. At any rate they were not seen again. The hawk migration reached its peak on October 21 in an enormous flight, or rather series of flights, which occupied the greater part of the day. It was not possible to make any estimate of the number that passed, but it must have been in the tens of thousands. The flight came in distinct waves, but the stragglers of one assemblage might be overlapped by the leaders of the following one. These hawks, so far as could be

determined, were all Swainson's, about ninety per cent being light phase adults and the other ten per cent melanistic birds of varying degrees of darkness, but no streaked young of the year were present. No red-tails or other hawks were noticed, but there was an occasional sprinkling of turkey vultures, migrating as an integral part of the flight. The direction from which this great mass came was, as in all other cases, the west, varying from true west to northwest.

The method of travel was interesting and designed to accomplish the maximum speed with the minimum of effort. There was no wing

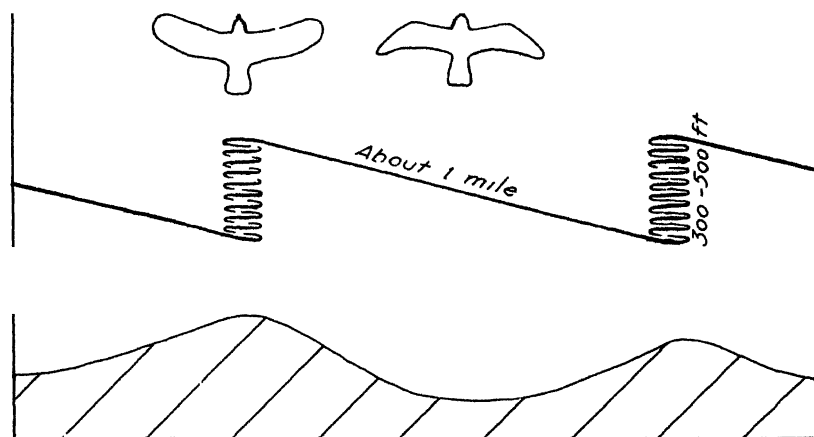


FIG. 12 Diagram to illustrate method of migration flight of Swainson's hawk, *Buteo swainsoni*

flapping whatever, except that a wing might now and then be dipped to avoid contact with another bird. It was evident that the birds could not maintain altitude and speed together, for on straight away flight they traveled at a high rate of speed, but rapidly lost height. At the end of about a mile, or as they arrived over the more prominent hilltops, the leaders went into a towering spiral. As the main part of the wave caught up, the air was filled with a whirling mass of birds, which viewed from directly beneath appeared to be an aimless zig-zagging and crisscrossing swarm, but when seen from one side was in reality an orderly, climbing ribbon. The leaders often gained the desired altitude and started on the next straight away before the tail-enders had arrived at the bottom of the corkscrew (fig. 12). Not the least remarkable part of the series of flights was the fact

that they invariably passed over the same hilltops, and residents told us that there was little variation from year to year. Practically the whole day was spent in attempting to secure specimens, but without success, for the lowest flying stragglers cleared the ridge over a hundred yards in the air.

Smaller flocks of from about 200 to well over 1,000 were seen daily until November 6, on which day the last flock of the season was noted. In all of these Swainson's hawks predominated, and other species accompanying them were present only as a sprinkling. In the flight of November 4 were a good many streaked young of the year, the only occasion on which they were detected. Turkey vultures were practically always present in greater or lesser numbers.

Spring collecting during the years of 1912, 1926, and 1927 was carried on in localities away from the migration route, and on only one date was a Swainson's migration seen. Along the foot of the north slope of Volcán de San Salvador is a new lava field, the result of the most recent eruption. This field, which reaches from one of the new craters on the north slope down the hill and out over the valley for several miles, is crossed by the railroad which runs from San Salvador to Sitio del Niño. On the evening of April 30, 1927, a few minutes after sunset, this field was white with roosting hawks which had settled for the night. There were several thousand birds in sight from each side of the train, most of which paid little attention to its passing, although occasional birds flew off to a greater distance. Of the several hundred seen at close range all were *swainsoni* in the light phase. The residents at Divisadero said that spring flights sometimes, but very rarely, stopped for the night on the lava butte north of the town, and we were informed by several people, independently, that after one such roost, many eggs had been found the day following.

All migrating species of raptors are collectively known as *asaquanes* and, in popular superstition, they are supposed to usher in the dry and wet seasons which certainly commence, respectively, at about the time of the southbound and northbound migrations. It is not unlikely that the general dates for migration are advanced or retarded by unusual weather conditions. The name of *asaquani* seems to be in general use for migratory hawks throughout Central America.

***Buteo albonotatus* Kaup. ZONE-TAILED HAWK.**

[*Buteo*] *albonotatus* Kaup, Isis von Oken, 40, Heft 5, cols. 329, 954, May, 1847
—"Mexico."

Specimens collected. None.

Status. Probably resident, though noted only in midwinter and spring in the Arid Upper Tropical Zone on Mt. Cacaguatique and Volcán de Conchagua.

Remarks. Adult zone-tailed hawks were noted at various times in December, 1925, flying over the oaks on Mt. Cacaguatique, and two adults, usually accompanied by a younger bird, were often seen over the barren hillsides and pine groves on Volcán de Conchagua in March, 1926.

Buteo albicaudatus hyospodius Gurney. SENNETT'S WHITE-TAILED HAWK.

Buteo hyospodius Gurney, Ibis, p. 73, Jan. 1876 - Medellín, Colombia.

Specimens collected. None.

Status. Rare migrant. Seen on Volcán de Conchagua March 4, 1926.

Remarks. This species was noted only on the summit of Volcán de Conchagua where, on March 4, 1926, a single bird flew past at a distance of about twenty yards. It was knocked down, apparently dead, but before it could be retrieved it recovered enough to escape. The bird was most probably a northbound migrant, for it was in the company of about a dozen migratory turkey vultures.

Parabuteo unicinctus harrisi (Audubon). HARRIS'S HAWK.

Buteo harrisi Audubon, Birds Amer. (folio), 4, pl. 392, 1837 between Bayou Sara and Natchez, Mississippi.

Specimens and records. Lake Olomega, 2 (August 16, September 8, 1925); Hacienda Zapotitán, 2 (June 12, 27, 1912). Also noted at Barra de Santiago (March 30, 1927); Lake Guija (May 27, 1927).

Status. Rare resident of the Arid Lower Tropical Zone. Apparently confined to swampy areas and the vicinity of the larger bodies of water.

Remarks. Examination of combined series of Harris's hawks in the Dickey collection, the United States National Museum, and the Natural History Museum at San Diego, shows that over the great area from Central America to the southern tier of the United States this species not only varies to a considerable degree individually, but that there is a decided tendency for some of this variation to become localized. Generally speaking, northern specimens are the blackest and southern ones the brownest. Those from the

extreme northwest part of the range in California, Arizona, and Sonora average the blackest of all, when birds of equally fresh plumage are compared. Juveniles in the chocolate type of plumage are very much in the majority in the north while the pale, streaked type is most numerous in the south. In the extreme northwest only the dark type of juvenile has been found, and this, combined with the characters shown by the adults, indicates that in that section occurs the maximum degree of blackness attained by the species. However, occasional specimens of both adults and young can be found not only in the Gulf states, but also from Mexican points, which are equally dark. The three adults from El Salvador are of the browner type and not distinguishable from the average run of southern Mexican birds. The El Salvador juvenile is the pale extreme, that is, with the underparts streaked with sooty brown on a buffy ground color.

Harris's hawks were only rarely encountered in El Salvador. Those which were taken were all perched near the ground over streams or swampy areas and were not particularly shy. However, single birds which were seen at Lake Guija and Barra de Santiago were so wild that they could not be approached nearer than several hundred yards.

Plumage notes.—Two adult males collected August 16 and September 8 are just finishing the annual molt, although they were otherwise in full breeding condition when taken. An adult female taken at Laguna Dam, California, on January 1, is in the identical stage of molt as are the two El Salvador birds mentioned above which were collected some four months earlier in the year.

Colors of soft parts.—Adult male: bill, horn-blue, tip blackish; iris, brown; cere, skin of loreal region and eyelids, edge of gape, tarsi and feet, bright yellow; claws, black.

Stomach contents.—Small frog, 1; small fish, 1.

Hypomorphnus urubitinga ridgwayi (Gurney). RIDGWAY'S
BLACK HAWK.

Urubitinga ridgwayi Gurney, List Diurn. Birds Prey, pp. 77, 148, 1884
Mexico and Guatemala.

Specimens and records.—Lake Olomega, 3; Colima, 1; Hacienda Zapotitán, 1; Barra de Santiago, 1; Lake Chanmico, 1; Rio San Miguel, 1. Also noted at Puerto del Triunfo.

Status.—Uncommon resident of swampy forest areas below 1,500 feet. It is most numerous in the coastal jungle but, given the presence of water, is likely to occur anywhere within its altitudinal limits.

Remarks. Ridgway's black hawk is very much less common than the two local forms of *anthracinus*, and the eight specimens listed represent the total number which it was possible to collect in three seasons' work in the field. In addition, probably twice that number were seen at one time or another, principally about Puerto del Triunfo and Barra de Santiago, but usually under circumstances which prohibited their collection. In the field this species is readily distinguished from *anthracinus*, not only by its larger size and more robust appearance, but by the pure white upper tail coverts. At closer range the white-barred thighs and dark-colored loreal area provide good additional recognition marks.

There is a general agreement with *anthracinus* in habits, since both are usually found near water, and both are rather sluggish and almost totally indifferent to human presence. The only call-note *ridgwayi* was heard to give was a loud whistling scream, deeper and harsher than that of *anthracinus*.

Plumage notes. Although only three immatures were collected, it is evident that more than two years are necessary in order to reach maturity. The youngest bird is a juvenal male taken at Colima, January 21, 1927. It was at this date acquiring many new feathers on the anterior half of the body, just as do a great many other young hawks in their first spring. However, these new feathers are scarcely different from those of the juvenal plumage. Next is an immature female which is just completing the first annual molt (August 8, 1925). The new feathers of the entire underparts from chin to under tail coverts are rich ochraceous buff with shaft streaks and terminal spotting of dull black. Such of the tail and wing feathers as have been renewed are intermediate in character between adult and juvenal. The head and hindneck are similar to the underparts. The third is an immature female which is just commencing the second annual molt (June 13, 1912). The new body and wing feathers are essentially like those of the adults, but the new tail feathers show many evidences of immaturity in the way of irregular markings and impure white areas. Whether or not the fully mature plumage is acquired at the third annual molt, there is not material at hand to show. Two adults taken May 14, 1912, and August 26, 1925, are respectively commencing and completing the annual molt. Two others taken April 4, 1927, and April 12, 1926, show that there had been a limited spring molt about the head, neck, upper back, and upper chest, these feathers being much newer than the remainder of the body plumage.

Colors of soft parts.—Adults: tarsi, feet, cere, and edge of gape, orange-yellow; bill, black, bluish at base; claws, black; iris, dark brown; skin of bristled preocular space, slaty (*not yellow* as in *anthracinus*). One-year-old: iris, brownish white; tarsi and feet, yellow; cere and edge of gape, dull greenish yellow; bill and claws as in adults.

Stomach contents.—At Lake Channmico an adult was eating a least grebe when shot. The grebe body was cleanly skinned, and its legs and wings had been bitten off. An immature taken at Lake Olomega contained the remains of an entire Inca dove and also what were presumably the broken eggs of the same bird, while another from the same locality had recently eaten a small mammal of unknown species. At Rio San Miguel an adult was seen, in company with other species, dashing about through the smoke and close behind the fire line of a burning grass and cane pasture. The food habits of *Hypomorphnus* evidently are very different from those of *Buteogallus*.

***Buteogallus anthracinus anthracinus* (Lichtenstein). MEXICAN BLACK HAWK.**

Falco anthracinus Lichtenstein, Preis-Verz. Vog., Mex., p. 3, 1830—Mexico.

Specimens and records.—Lake Olomega, 5; Rio Goascorán, 1; Mt. Cacaguatique, 1; San Salvador, 1; Hacienda Zapotitán, 3. Also noted at Volcán de San Salvador; Rio San Miguel; San José del Sacare; Lake Guija; Miraflores.

Status.—Common resident about fresh-water streams and lakes throughout the Arid Lower Tropical and Arid Upper Tropical Zones (fig. 13).

Remarks.—Throughout its Salvadorean range the distribution of the Mexican black hawk is governed by the presence of water. The center of abundance is, therefore, necessarily on the coastal plain and about areas where there are extensive marshes, such as at Hacienda Zapotitán. Up the valley of the Lempa and its tributaries this species has penetrated into the headwaters of small streams in the pine belt along the Pacific slope of the cordillera and into the oaks on Mt. Cacaguatique. On the volcanic coastal range it straggles upward as high as 4,500 feet and thus reaches into the lower part of the Humid Upper Tropical Zone. It appears to be resident wherever found, but young birds doubtless often wander or are driven from their home localities after reaching maturity. Given the essential requisite of water, there is no association in which these hawks may not be found. Jungle along running streams, tule marshes, flooded

forests, deep barrancas supporting perhaps only a trickle of water, mountain streams running through pine barrens or groves of coffee, or even the rocky shores of inland lakes are all places in which one is almost sure to find them (pl. XXIV).

To anyone used to the wariness of all hawks in more northern regions, the tameness of the present species is a never-failing source of surprise. As an example, although perhaps an extreme one, may be cited the instance of a bird which, stung in the feet by an accidentally fired charge of dust shot from the "aux," made no attempt to fly, but remained on the tall dead stub where first discovered. Ordinarily it is not necessary to use any caution whatever when

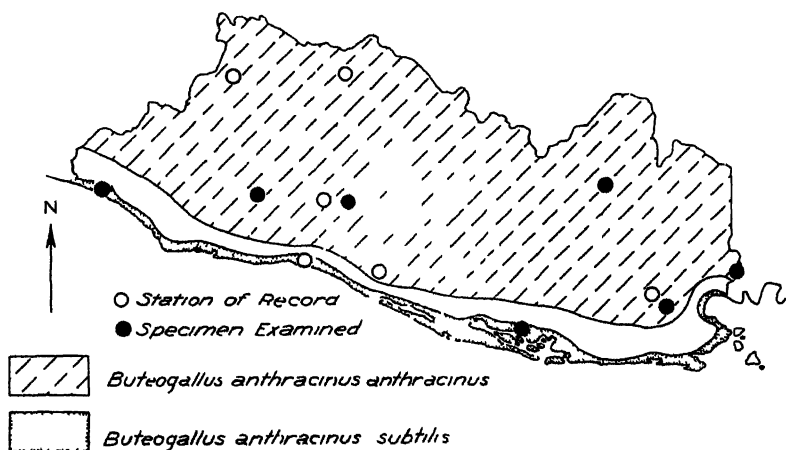


FIG. 13. Distribution of two races of the black hawk, *Buteogallus anthracinus*, in El Salvador.

walking up to within a reasonable distance of these birds, nor do gunshots usually alarm them. At Hacienda Zapotitán a pair of adults sat unmoved on a dead stub while several shots were fired at other birds within twenty yards of them, although after each shot one or both gave the characteristic whistling screams.

Nesting. A nest found at San José del Sacare on March 13, 1927 was about twenty-five feet from the ground in a fifty-foot young pine tree growing from the bottom of a steep-banked ravine. It was supported by two small horizontal branches and placed against the trunk. The material used was medium-sized dead twigs, up to half an inch in diameter, and the rather shallow saucer in the center was well padded with green oak leaves. Although both parents were at the nest when it was found, and the female (?) was seen sitting on the nest on the 16th, there were no eggs in it on the 18th, the date

of our departure from that collecting station. When this female was on the nest, it was possible to walk along the bank on a level with her and not more than fifteen yards away without frightening her off. Her custom, if she thought she was observed, was to stand upright with the bill pointed straight up, remaining perfectly still until she thought all danger was past. A juvenile, just able to fly and with down still adhering to its plumage, was taken at Hacienda Zapotitán June 25, 1912.

Plumage notes.—The juveniles of *anthracinus* resemble very much in color and tail pattern the second-year stage of *ridgwayi* and are difficult to distinguish from that species except by their very much smaller size and more slender proportions. In the first spring there is a first prenuptial molt which results in the usual acquisition of a variable number of new feathers on the anterior parts of the body. These new feathers are similar to those of the adult plumage except that there is very much more concealed or partially concealed buff. In the fall, at the time of the first annual molt, a plumage is attained like that of fully adult birds except for the greater amount of partially concealed buff on the hindneck. The black of the plumage generally tends to be more sooty, less plumbeous, than in old birds. Thus it seems certain that *anthracinus* attains maturity at least a year earlier than *ridgwayi*. The complete annual molt of both adults and immatures usually takes place in September, although one old female taken as late as October 25 was still acquiring new feathers.

Colors of soft parts.—Adults: cere, edge of gape, rami of maxilla and mandible, bare preocular area, tarsi and feet, bright, waxy yellow; bill, plumbeous black, paler and more bluish basally; iris, dark brown; claws, black. Nearly mature: similar, but cere, gape, etc., greenish yellow. Juveniles: similar, but cere, etc., olive-green to yellowish green; tarsi and feet, dull, greenish yellow.

Stomach contents.—Grasshoppers, 3; caterpillars and grasshoppers, 1; bird (*Cissilopha*) and grasshoppers, 1; unidentifiable small bird, 1; small fish (sp.?), 2; wasp larvae, 1. The wasp larvae were of a large black and yellow species. They belonged to some paper-making species as was evident from scraps of nest in crop and stomach, but how they were obtained we have no idea. A great number had been eaten, for the bird was gorged to the fullest capacity. This hawk also follows grass fires closely, probably in search of its favorite food, grasshoppers.

Buteogallus anthracinus subtilis (Thayer and Bangs). MAN-GROVE BLACK HAWK.

Urubitinga subtilis Thayer and Bangs, Bull. Mus. Comp. Zool., 46, p. 94, 1905. Gorgona Island, southwestern Colombia; Bangs, Bull. Mus. Comp. Zool., 70, p. 191, 1930. Salvador.

Buteogallus subtilis Peters, Check-list Birds World, 1, p. 245, 1931—El Salvador.

Urubitinga anthracina Salvia and Godman (not *Falco anthracinus* Lichtenstein), Biol. Centr.-Am., Aves, 3, p. 81, 1900—part, La Libertad; Ridgway, Bull. U. S. Geol. and Geog. Surv. Terr. 2, p. 170, 1876—Acajutla.

Specimens and records. Puerto del Triunfo, 6 (December 31, 1925 to January 15, 1926); Barra de Santiago, 2 (March 31, April 1, 1927). Recorded from La Libertad; "El Salvador"; Acajutla.

Status.—Common resident of mangrove lagoons along the sea-coast (fig. 13).

Remarks. Comparison of the eight El Salvador skins of *subtilis* with the type of that race in the Museum of Comparative Zoology shows them to be without doubt one and the same subspecies. Chapman¹ has already traced this small race from southern Ecuador to eastern Panama, and therefore its distribution will probably be found to be continuous along the Pacific coast as far northwest as El Salvador. Size appears to be the best means of distinguishing *subtilis* from *B. a. anthracinus*, for the rufous mottling on the wing quills, which was supposed to be one of the characters of *subtilis*, is evidently a sign of immaturity and common to both races. As to the width of the white tail band, this varies in typical *anthracinus* from 30 to 70 mm. Therefore, we are not particularly enthusiastic about accepting "white band 40 mm."² as a diagnostic character for *subtilis*. Comparative measurements of adults are as follows:

	Wing	Tail	Tarsus	Middle toe minus claw
4 male <i>subtilis</i>	325 345	179-196	81.0-84.5	39.2-40.4
4 female <i>subtilis</i>	336 357	190 200	85.5-87.3	41.0 41.8
9 female <i>anthracinus</i>	380 398	204 226	89.4 96.0	42.6 46.1

While both Bangs and Peters consider *subtilis* to be a distinct species, a trinomial appears to us to express best its true relationships. The presence of both forms in localities closely adjacent does not necessarily argue for specific distinction, for it may well be that one race is a relatively recent invader. At any rate *anthracinus* and *subtilis* occupy, locally, different ecologic niches and are as truly representative forms as though separated by physical barriers.

¹ Bull. Amer. Mus. Nat., Hist. 55, p. 233, 1926.

² Swann, Syn. Accipitres, ed. 2, p. 98, 1922.

On arrival at Puerto del Triunfo it was immediately noticeable that the black hawks of the mangrove lagoons were decidedly smaller than those which had previously been encountered in the interior. The differences are only partly expressed by linear measurements, for *subtilis* is also more slender and less "stodgy" in appearance. It is doubtful if this race ever leaves the immediate vicinity of the mangrove lagoons.

Stomach contents.—This is a beach-comber often seen walking about on the mud flats and along the beaches at low tide. At Puerto del Triunfo one was seen running (not hopping) in shallow water on a sand bar near one of the numerous mangrove islands. When shot its stomach contained nothing but the meat of clams of a species which was very common at that point. At Barra de Santiago one of the chief sources of food was the small fiddler crabs which swarmed over the mud flats at low tide. However, the choice of food is evidently not a restricted one and probably includes almost anything edible. One individual within half an hour, was seen, to run down several very agile crabs, gorge on a putrid, cast-up fish, and skilfully pick up a wing-tipped sandpiper.

Busarellus nigricollis nigricollis (Latham). BLACK-COLLARED HAWK. GAVILÁN PESCADOR.

Falco nigricollis Latham, Index Orn., 1, p. 35, 1790—Cayenne.

Specimens and records.—Lake Olomega, 3; San Sebastián, 2; Rio San Miguel, 1; Puerto del Triunfo, 1. Also noted at Hacienda Zapotitán; Colima; Barra de Santiago.

Status.—A fairly common resident locally in marshy lowland areas. It is most common on the seacoast and coastal plain, but occurs inland in favorable localities.

Remarks.—The measurements of the four males (wing 372 388) and the two females (wing 400 402) fall nearest to the measurements given by Swann¹ for the typical race. On this basis only, and without comparison with either of the same author's races, *B. n. macropus* of British Honduras and *B. n. australis* of Argentina, the six El Salvador specimens are listed as *nigricollis*.

Although the spiny-soled feet of *Busarellus* are excellently adapted to the catching of fish and frogs, the plumage has failed to develop any waterproof qualities. In consequence, these hawks spend most of their time perched on convenient stubs overlooking their hunting

¹ Syn. Accipitres, ed. 2, p. 95, 1922.

areas, drying out the plumage in preparation for the next dive, for after a complete immersion they are practically incapable of flight. At Lake Olomega one which was seen to plunge awkwardly into a small river could not rise directly from the water, though unburdened by any prey, but flopped awkwardly to the shore. About an hour later this bird was shot and its plumage, including the wing quills, was still much draggled and water-soaked. When completely dry the body plumage is decidedly more lax and fluffy than that of most hawks. Most of the hunting or rather fishing seems to be done in very shallow water along shore, for as a rule only the thighs and underparts were found to be wet.

Nesting. A nest, the contents of which were not determined on account of inaccessibility, was found in a large tree near the edge of Lake Olomega on September 3, 1925. The nest was about the size of that of a Cooper's hawk and was probably only recently built, for many green leaves were visible about the circumference. The parents were very shy and only the male was collected.

Plumage notes. The breeding male collected on September 3, 1925, is about halfway through the annual molt. A pair of adults taken, respectively, April 7 and 8, 1926, show a rather extensive spring body molt. An immature female taken at Puerto del Triunfo, January 17, 1926, is in heavy molt including wings and tail. She is a one-year-old (?) bird attaining the mature plumage. As in the case of several other birds, the immatures of which have the first complete (annual) molt at a different season than do the adults, it will require many observations to determine the length of time necessary for the molts of the young to become synchronized with that of the mature population.

Colors of soft parts. Adults: iris, bright, reddish brown; tarsi and feet, bluish white; bill, cere, and claws, black; edge of gape, plumbeous blue.

Stomach contents. Frog, 1; small catfish, 1; small fish, 3. One bird was seen carrying what appeared to be a small snake.

***Spizaëtus ornatus vicarius* Friedmann. CRESTED FOREST EAGLE.
AGUILA.**

Spizaëtus ornatus vicarius Friedmann, Journ. Wash. Acad. Sci., 25, p. 451, Oct. 15, 1935—Manatol (= Manatee) Lagoon, British Honduras.

Specimens and records. Puerto del Triunfo, 2 (January 8, 12, 1926); Barra de Santiago, 1 (April 3, 1927). Also noted on Volcán de San Miguel (March 12, 1926).

Status.—Probably resident in suitable localities near the seacoast, but noted only rarely in midwinter and spring in the coastal jungle. Observed in March flying along the south slope of Volcán de San Miguel, but evidently as a transient.

Remarks.—This beautiful, crested eagle was found to be decidedly rare. At Puerto del Triunfo on January 8, 1926, an adult female flapped out of the coyol palm undergrowth beside a trail through the deep jungle and alighted on a horizontal branch over the road about thirty yards away. Upon dissection her stomach was found to contain scraps of monkey carrion and hair and also some fresher meat. Investigation of the spot from which the eagle had been flushed revealed a freshly killed black vulture, the back of which was eaten out. The assumption is that the eagle had been picking at the few remaining scraps of flesh and skin still adhering to the bones of a monkey killed there several days previously, and that when interrupted by the vulture it had promptly killed the intruder and was starting to eat it when discovered and shot. A fully grown female of the year was shot only a few hundred yards from this same place on January 12. It was found sitting on a branch of a big tree only a few yards from the ground and in full view of the narrow woods-road. Both of these birds, as well as the adult male which was shot in the swamp forest at Barra de Santiago on April 3, 1927, were remarkably tame and allowed a close approach.

In flight and when perched this eagle is buteonine in appearance. The occipital crest is conspicuous in life, and when the bird is at rest and looking downward, it falls forward at about right angles to the bill.

Colors of soft parts.—Adults: iris, bright orange; bristled preocular space and eyelids, pale, grayish green; cere and edge of gape, dull, greenish yellow; bill, black, basal half of mandible, bluish horn; feet, bright yellow; claws, black. Full-grown female of the year: similar to adults, but iris yellowish white.

Circus hudsonius (Linnaeus). MARSH HAWK.

Falco hudsonius Linnaeus, Syst. Nat., ed. 12, 1, p. 128, 1766—Hudson Bay.

Specimens and records.—Divisadero, 1 (October 15, 1925); Colima, 1 (January 24, 1927); Los Esesmiles, 1 (February 11, 1927); Lake Olomega, 1 (April 11, 1926). Also noted at Mt. Cacaguatique (November 19 to December 23, 1925); Puerto del Triunfo (December 30, 1925 to January 27, 1926); and Volcán de San Miguel (March 12, 1926).

Status. Fairly common fall and spring migrant and winter visitant to open country everywhere. Dates of arrival and departure are October 12 and April 11.

Remarks. The first marsh hawk of the fall migration was seen flying eastward, high in the air, at sundown at Divisadero on October 12, 1925. No more appeared until a few were seen in a mixed flight of hawks and turkey vultures on October 15. After the latter date marsh hawks were to be found hunting over open country and apparently established for the winter, although a few were seen as migrants traveling with other hawks. At Colima, Puerto del Triunfo, and Los Esesmiles they were perhaps more common than at most places, and it was usual to see three or four a day. It was noticeable that practically all were in brown plumage, either females or young males, and on but two days were old males noted. On February 2, 1927, an adult male was seen beating back and forth over the fern bracken at Los Esesmiles. What was probably the same bird was shot on the 11th. The specimen from Colima is a young male with the first, grayish feathers of maturity appearing on the breast.

While in winter quarters marsh hawks show little preference for one altitude over another, for they were found to be present wherever there was sufficient open country for hunting purposes. Even clearings of a few acres in the midst of wooded areas were sometimes frequented. In brief, the marsh hawks were found in open country generally from sea level to 6,400 feet.

***Geranospiza nigra nigra* (Du Bus). BLACK CRANE HAWK.**

Ischnoscelus niger Du Bus, Bull. Acad. Roy. Belg., 14, pt. 2, p. 102, 1847-Mexico.

Specimens collected. Lake Olomega, 2; Rio San Miguel, 1; Rio Goascorán, 3; Puerto del Triunfo, 1; San Sebastián, 1; Colima, 1.

Status. Fairly common resident of the coastal plain; occurring as a straggler up the Lempa River as far as Colima.

Remarks.— This species is primarily a bird of swamp forest and mangrove lagoons and is seldom found away from the immediate vicinity of water. At Lake Olomega birds still in juvenal plumage were sometimes met in the hills above the lake, but marshy streams through the forest, boggy pastures and mangroves were usually the preferred habitats. The black crane hawk is a more active bird than either *Hypomorphnus* or *Buteogallus*, with both of which it may frequently be found, and it often beats back and forth across a

meadow in the manner of a marsh hawk. A burning pasture is a sure attraction, and it often hunts through the smoke right behind the fire line.

One of the best field marks, aside from the flight, is the black cere and loreal space. In *Buteogallus* the yellow color of these parts is visible for some distance.

Plumage notes.—The juvenal plumage, differing from the adult in white (with shaft streaks of black) forehead, superciliary streak, auriculars, chin, throat, and brokenly barred underparts and thighs, is worn, as is usual with the larger hawks, until the second fall, at which time the uniform slaty black plumage, the red color of the iris, and orange hue to the legs are attained.

Colors of soft parts.—Adults: iris, crimson; bill, black, basal one-third to one-half of mandible, plumbeous; cere and claws, black; tarsi and feet, orange. Juvenile in February (several months old): similar, but iris reddish brown. Fully grown juvenile (recently from nest) in August: similar, but iris orange, and tarsi and feet more yellowish (less reddish) orange.

Stomach contents.—Grasshoppers, 2; young rat (*Tylomys*), 1; small lizard, 1; batrachian, 1.

***Pandion haliaëtus carolinensis* (Gmelin). OSPREY. GAVILÁN PESCADOR.**

Falco carolinensis Gmelin, Syst. Nat., 1, pt. 1, p. 263, 1788—South Carolina.

Specimens and records.—Lake Olomega, 1 (August 5, 1925); Puerto del Triunfo, 1 (January 24, 1926). Also noted at La Libertad (April 28, 1926); Barra de Santiago (March 31 to April 19, 1927); Lake Olomega (July 25 to September 22, 1925).

Status.—Present in fair numbers coastwise throughout the year, but apparently not nesting. Occurs at favorable localities inland, as at Lake Olomega.

Remarks.—It is probable that the osprey population is composed principally of North American birds, the young of which may possibly not return north the first year. The female taken at Lake Olomega August 26, 1925, is a one-year-old bird, which on the date of collection was molting heavily. No indications of pairing were observed, and each individual had, as a rule, its own section of mangrove-bordered channel, over which it watched from some tall lookout snag. No ospreys were ever seen in the migratory hawk flights.

Family FALCONIDAE. Caracaras and Falcons

***Herpetotheres cachinnans chapmani* Bangs and Penard.**

LAUGHING FALCON. GUÁS.

Herpetotheres cachinnans chapmani Bangs and Penard, Bull. Mus. Comp. Zool., 62, p 37, 1918 Rio Hondo, Quintana Roo, Mexico.

Specimens and records.- Lake Olomega, 1; Divisadero, 1; Rio Goascorán, 1; Colima, 1; San Salvador, 1; Hacienda Zapotitán, 1. Also noted at Barra de Santiago.

Status.- Uncommon resident of the Arid Lower Tropical Zone. Although recorded from sea level to 2,300 feet, it is apparently more common on the coastal plain than in the foothills.

Remarks.- The six birds collected are somewhat arbitrarily referred to the Mexican race, but they are not typical and probably are really intergrades toward *H. c. cachinnans*. The four males give the following measurements: wing, 275-295; tail, 211-230, and therefore approximate *chapmani* in size. The two females, however, are very small, measuring only 267-272 in wing and 201-215 in tail, and thus are closer to the dimensions of *cachinnans*. In color the underparts vary from "cinnamon buff" to "light buff." In the present series it is clearly shown that relative depth of color, in this locality at least, is correlated with wear. The most fulvescent specimen of all is one which had just finished the annual molt on the date of capture, August 25. Those taken October 13, October 25, January 24, and March 7, are progressively paler; that is, the October birds are intermediate and those of January and March the palest. To clinch the contention that color is to a great extent dependent on season, there is a specimen taken June 12 which is just halfway through the annual molt. The feathers of the old plumage are nearly white, while the new ones are "cinnamon buff." The series shows a good deal of variation in the amount of spotting on the under wing coverts and in the character of the markings on the central rectrices.

The function of the asaqueanes, the migratory hawks, is to bring the rains in the fall and to take them away in the spring. The laughing falcon, or guas, is the local forecaster, and when he becomes especially vociferous rain is not far away. With due regard for his reputation he usually waits until the sky is heavily overcast, or even until the first drops of the approaching storm are spotting the leaves, before becoming positive on the subject. In all seriousness, though, this extraordinary falcon is much more vocal during the rainy season

than in the "summer." Whether the activity is correlated with the breeding season or not is unknown to us, for the nesting time was never even approximately determined. Personally we believe that a large proportion of the calls are uttered purely in a spirit of play. Since this species feeds almost entirely upon small reptiles, the birds are necessarily inactive when their prey takes to shelter on dark days and, being active, restless creatures, their surplus energy is expended in cackling. A pair which lived in the thin forest facing some straight-walled, lava buttes along the Goascorán River at Manzanilla, apparently derived a great deal of excitement or pleasure, or possibly both, from the echoes thrown back from the cliffs. One of the characteristics of this species is that both of a pair will take up stations at some distance apart and call back and forth, each call bringing an instant response from the companion. The pair in front of the cliffs used to attempt to answer echoes as well as each other and at times became almost hysterical with excitement. The common call, indeed the only one any of these birds was heard to utter, is the "laugh" from which their name is derived. This begins as spaced repetitions of a loud, high pitched "Hah," and the intervals become shorter and shorter until the notes become blended into wild, cackling laughter.

Laughing falcons were found to be generally distributed throughout the Arid Lower Tropical Zone, but were nowhere common. They were most likely to be found in gallery forest.

Colors of soft parts.—Adults: iris, dark brown; bill and claws, black; cere, edge of gape, and skin at base of bill, orange-yellow to pale yellow; tarsi and feet, pale, dull yellow to olive-buff.

Stomach contents.—Although the authors of the *Biologia* include rodents, birds, and grasshoppers in the diet of this species we found it in El Salvador to subsist entirely on small reptiles.

Micrastur semitorquatus naso (Lesson). NORTHERN LONG-TAILED FALCON. GUÁS.

Carnifex naso Lesson, Rev. Zool., 5, p. 379, 1842—Realejo, Nicaragua.

Micrastur melanoleucus Salvin and Godman (not *Sparrius melanoleucus* Vieillot), Biol. Centr.-Am., Aves, 3, p. 107, 1901—part, La Libertad.

Specimens and records.—Lake Olomega, 4; Puerto del Triunfo, 2; Sonsonate, 3; San Sebastián, 1; Lake Chanmico, 1; Volcán de Conchagua, 1 (skeleton). Also noted at Barra de Santiago. Recorded from La Libertad.

Status.—Fairly common resident of wooded areas on the coastal plain, straggling inland occasionally to such favorable points as Sonsonate and Lake Chanmico and to higher elevations such as Volcán de Conchagua.

Remarks. Lesson, in his generic description of "*Carnifex*," states that his bird came from Realejo, but in the specific description immediately following he gives as a range "les forêts équatoriales de l'Amérique [sic] meridionale que baigne l'océan Pacifique." The description is that of a young bird, but the tail measurement given (27 cm.) is certainly best applicable to the northern race. There can be little doubt, in view of the initial statement, that Realejo is the actual type locality, and that the subsequent ascription of *naso* to "the equatorial forests of the Pacific coast of South America" was a *lapsus*. The name *naso*, of course, long antedates *Falco percontator* of Cabot.

Measurements of the El Salvador series are as follows:

	Wing	Tail	Culmen from cere	Tarsus
2 adult males	257-261	272-277	21.5 (both)	82 -86
3 adult females	260-270	275-290	21.5-23.4	88.5-90

The corresponding measurements given by Dr. Wetmore¹ for a male of typical *semitorquatus* from Paraguay are: wing 246; tail 248; culmen from cere 18.0; tarsus 81.5.

This curious falcon is not uncommon in wooded areas in the lowlands. The facial ruff and long tail are reminiscent of the marsh hawk, but the resemblance stops there for, in spite of the heavy body and long tail, the falcon is a swift and powerful flier which ranges through the forest with the speed and certainty of a goshawk. The long tail must be of great service in the quick dodging necessary when hunting through close-growing woods and undergrowth where these birds are most often found. But even with so efficient a rudder the wear on the plumage is excessive, and specimens taken just before the annual molt often have the tail feathers and plumage of the underparts worn nearly to the shafts.

Because of the great similarity in call notes no local distinction is made between the long-tailed and laughing falcons, both being widely known as "guas." The vocal difference is readily recognized after a relatively short acquaintance, but nevertheless the calls of the two species are not unlike. There is a startling human quality in each, and each starts with a series of deliberately spaced "laughing" calls, "Hah!—hah!—hah!", which in the long-tailed falcon remain

¹ Bull. U. S. Nat. Mus., 133, p. 99, 1926.

spaced and unhurried, but which in the laughing falcon are finally mingled into almost unspaced cackling. On August 28, 1925, when we were night-hunting at Lake Olomega, a long-tailed falcon was heard calling in the forest at about four-thirty in the morning, a good hour before daylight. It was found flying from tree to tree in a patch of low, dense woods, apparently perfectly able to get about in the dark. It was finally shot by the light of a hunting lamp when it came close to investigate an imitation of its call.

Nesting.—Juveniles, but recently on the wing, were taken August 18, 21, and 25, 1925. A late May or early June nesting is thereby indicated.

Plumage notes.—Two phases are shown both in adults and juveniles. In the young the light phase has the underparts barred with sooty black on a buffy white ground, while the dark phase is barred with dark brown on an ochraceous ground. The two types are represented by one and four fresh-plumaged specimens, respectively. In the adults one phase is pure white below while the other is creamy buff. The traces of barring sometimes seen on the underparts of supposedly adult specimens may be due to immaturity, but this we consider doubtful since a one-year-old bird (dark phase) taken on May 16, 1912, was molting into an immaculate, creamy buff, ventral plumage with no cross-barring evident in the new plumage. An adult taken on July 14, 1912, was well along in the annual molt and was changing on the underparts from immaculate buff to a new plumage of the same type. The five adult birds are three in the buff phase and two in the pure white. Both sexes are represented in each phase.

Colors of soft parts.—Adults: iris, dark brown; bill and claws, black; cere, bare skin of face, edge of gape, and extreme base of mandible, olive to light olive-green; tarsi and feet, yellow to bright, greenish yellow. Young: similar to adults, but cere, tarsi, and feet darker and more greenish.

Stomach contents.—Lizards of several species, 3; small birds (unidentifiable), 2. At Lake Chanmico one of these falcons was seen pursuing a small ground dove.

***Micrastur ruficollis guerilla* Cassin. NORTHERN WOOD FALCON.**

Micrastur guerilla Cassin, Proc. Acad. Nat. Sci. Phil., 4, p. 87, 1848 (1850)—Jalapa, Vera Cruz, Mexico.

Specimens collected.—Mt. Cacagatique, 1 (December 21, 1925).

Status.- Rare winter visitant (possibly resident) in the interior mountains.

Remarks. Although but one specimen was taken, it is believed that others were seen in the same locality. The bird collected, an adult male, was found at dusk in an oak grove at 3,500 feet in the oak-pine association. It was very active and noisy, cackling loudly and making short flights through the grove. In response to squeaking, it flew out to a stub in a small cleared space where it could barely be made out in the gathering darkness. Its stomach contained portions of a mouse (*Heteromys*) and small reptile scales.

Colors of soft parts.- Adult male: iris, brownish orange; maxilla, black, with base near cere dull orange; mandible, dull orange; tarsi, feet, cere, ocular skin, and edge of gape, orange-yellow; claws, dusky with bluish bases.

***Polyborus cheriway audubonii* Cassin. AUDUBON'S CARACARA. QUERQUE.**

Polyborus auduboni Cassin, Proc. Acad. Nat. Sci. Phil., 17, p. 2, 1865—Florida.

Specimens and records.- Lake Olomega, 1; Lake Channmico, 2; San Salvador, 1; Hacienda Zapotitán, 3; Divisadero, 2; Puerto del Triunfo, 1; Rio San Miguel, 1; Sonsonate, 1. Also noted from every collecting station in El Salvador.

Status.—Common resident everywhere from sea level to at least 6,500 feet, though most numerous about small villages and cattle ranches in the lowlands and lower foothills.

Remarks.- Caracaras are certainly more numerous at low elevations than at high ones, with perhaps the greatest concentration about cattle haciendas on the coastal plain. None were met with in the cloud forest, but there were at least a dozen which stayed about the collection of mud and straw huts at 6,500 feet in the pine-prairie association on Los Esesmiles. This was the maximum elevation at which the species was found.

While they do not flock together like vultures and normally hunt singly or in pairs, favorable local conditions may temporarily bring a good many together. On the short-grass pastures at Hacienda Zapotitán in July, 1912, groups of a dozen or more caracaras were seen every day walking or running about in their peculiar, stiff-legged way in expert pursuit of grasshoppers, or clustered about dead or dying calves in company with their kindred spirits, the black vultures.

The long legs and strong, straight-clawed feet of the caracaras are excellently adapted to the semiterrestrial life which they lead, and when in search of grasshoppers, beetles, and similar small fare, they thoroughly quarter the ground on foot in preference to flying. In spite of this adaptation, the feet still retain a certain degree of grasping power, for in a pasture near Santa Rosa a bird was watched for some time as it turned cakes of dried cattle manure by grasping them under the far edges and reversing them with a pulling motion. They are also able to carry sticks and other nest material, though the bill is the favorite means of transporting small or light objects. Some birds carry about in their bills small objects such as sea shells, pebbles, or bits of wood—with what object is unknown—but the circumstance was observed too often to be accidental.

In flight the bill is normally pointed downward as if the bird were using binocular vision in scanning the ground below. The resulting profile, together with the prominent black and white plumage, is so characteristic that this species is unmistakable at any distance.

Nesting.—Juveniles only recently out of the nest were taken at Lake Chanmico May 21 and June 6, 1912, and at Zapotitán in July, 1912, young of the year and adults were still together as family parties. At Barra de Santiago in early April, 1927, a pair was carrying nesting material into the crown of a tall cocoanut tree near the village, while another was working on a large nest in a small thorny tree at the edge of the lagoon.

Plumage notes.—The juvenal plumage is, as with most hawks, carried a year. A bird taken at San Salvador April 11, 1912, was molting from an old, ragged, juvenal plumage to the subadult stage, in which the general markings are like those of the adult, but in which the whole tone of the plumage is decidedly brownish, and the wing coverts and central underparts more or less conspicuously cross-barred with lighter markings. A male (February 13), which had evidently been nearly a year in this intermediate plumage was, when shot, a nonbreeder. Another bird of this type (sex unknown) taken at Zapotitán on June 25, 1912, was molting to the blackish plumage of maturity. Two adults taken at the same time (June 25) were about halfway through the annual molt.

Colors of soft parts.—Adults: bill, light blue; cere, orange to orange-yellow; skin of face and chin, orange-red to orange-yellow; claws, black; tarsi and feet, orange-yellow. Immature stages were, through oversight, not recorded.

Stomach contents.—Grasshoppers, 1. All sorts of refuse from about human habitation, and carrion wherever found, is eaten with as much gusto as though the bird were in fact a vulture. Along the seacoast, cast-up, putrid fish is a frequent source of food supply. Grasshoppers, pursued on foot, apparently form a much relished item on the bill of fare.

Falco peregrinus anatum Bonaparte. DUCK HAWK. HALCÓN.

Falco anatum Bonaparte, Geog. and Comp. List, p. 4, 1838—Egg Harbor, New Jersey.

Falco peregrinus Salvin and Godman (not of Tunstall), Biol. Centr.-Am., Aves, 3, p. 114, 1901—Acajutla.

Specimens and records.—No specimens. Recorded from Acajutla.

Status.—Detected certainly only as an uncommon spring migrant, principally along the seacoast.

Remarks.—Large falcons were not infrequently seen in the distance. In three instances they came close enough to be certainly identified, but always when it was not possible to shoot them. On March 22, 1926, a very large adult, probably a female, was seen at about 3,500 feet altitude on Volcán de San Miguel. This bird flew not more than twenty yards overhead, and there can be no mistake in the identity. At Lake Olomega on April 6, 1926, another large adult dashed past in pursuit of some shore birds, and near Acajutla on April 14, 1927, an adult was noted flying north along the beach.

It is probable that a good many duck hawks follow the shore bird migration, and also that the species winters in El Salvador, for several large falcons which presumably were peregrines were seen at Puerto del Triunfo in January, 1926. The citation given in the *Biología* for Acajutla is without date, but most probably the record was made in March, 1863, when Salvin, to whom it is credited, was a passenger on the *Guatemala*, captained by J. M. Dow. Whether this was a sight record or based on a collected specimen is not clear.

Falco albigularis albigularis Daudin. WHITE-THROATED FALCON. HALCONCILLO.

Falco albigularis Daudin, Traité d'Orn., 2, p. 131, 1800—Cayenne.

Specimens and records.—Lake Olomega, 1; Rio San Miguel, 2; Lake Chanmico, 3; Hacienda Chilata, 1. Also noted at Barra de Santiago, Ciudad Barrios; and Volcán de San Salvador.

Status.—Fairly common, but very local resident (usually in the vicinity of water) in the Arid Lower Tropical Zone though straggling occasionally to an altitude of 4,500 feet.

Remarks.—The great individual variation shown in the seven specimens collected and in the series in the U. S. National Museum seems to invalidate both of Chubb's races *F. a. pax* of Bolivia and Argentina and *F. a. petoensis* of Yucatan.¹ Adults of this species are very much paler and bluer than young of the year and also lack the extensive rufous edgings on the central underparts; furthermore the under tail coverts are immaculate in old birds while in the young they are frequently (always?) heavily cross-barred with black. We are utterly unable to follow Stresemann² in considering this very distinct species a race of the old world *Falco subbuteo* L. nnaeus. Its relationships obviously lie closer to *Falco deiroleucus* Temminck, which Stresemann in turn considers a race of *Falco peregrinus*.

These little falcons, peregrines in miniature, are in no respect behind their larger relatives in aggressiveness or power of flight. In some localities they are a terror to least grebes, and at Lake Chamicó they were seen striking at mudhens as well. At this place a stump about two feet in height and at the edge of the water was used regularly as a dining table by a white-throated falcon, and reversed grebe skins were several times found beside it. Here also a young male of the year was seen to pursue and drive across the lake an adult gray hawk (*Buteo plagiatus micrus*). A favorite perch is the topmost branch of some dead tree which reaches well above the surrounding forest, and from such a lookout frequent flights are made in pursuit of anything eatable which chances to pass. The occupant of such a perch which projected above the mangroves at Barra de Santiago was very active in the short interval of dusk, making short flights into the air probably after bats or insects and occasionally diving out of sight into the mangroves.

Nesting.—On February 3, 1926, a pair was seen about a tall dead tree in a swampy pasture at Rio San Miguel. The small male repeatedly entered a knot hole at least a hundred feet from the ground, but the female did not seem particularly interested in spite of the continuous quavering cries of her mate. She at once left the locality when the male was shot. On February 10, the site was again visited when it was found that the female had secured a new mate. When she was shot, on this latter date, it was apparent that at least one egg already had been laid, and another was in the oviduct with the shell just beginning to form. Young on the wing with

¹ Bull. Brit. Ornith. Club, 34, pp. 21–22, 1918.

² Journ. fur Orn., 72, p. 437, 1924.

plumage already showing some slight wear were taken May 19 and June 6, 1912.

Colors of soft parts. Adults: iris, dark brown; cere, edge of gape, and ocular space, bright, greenish yellow; bill, plumbeous blackish, mandible and lower base of maxilla, plumbeous; tarsi and feet, bright orange-yellow; claws, black.

Stomach contents.—The stomachs of three birds contained masses of insect remains. Least grebes are frequently pursued and sometimes caught, but insects seem to constitute, in this locality, the main diet. That the name "bat falcon" is not always a misnomer may be inferred from the fact that a specimen taken by Peters in Honduras¹ had its crop and stomach filled with bat remains.

Falco sparverius sparverius Linnaeus. EASTERN SPARROW HAWK.
KLIS-KLIS.

Falco sparverius Linnaeus, Syst. Nat., ed. 10, 1, p. 90, 1758—South Carolina.

Specimens and records.—Monte Mayor, 1 (October 6, 1925); Divisadero, 5 (October 16 to November 13, 1925); Puerto del Triunfo, 1 (January 7, 1926); Los Esesmiles, 3 (February 15 to March 7, 1927); Volcán de Conchagua, 1 (February 26, 1926); San Salvador, 3 (March 6 to 14, 1912); Volcán de San Miguel, 2 (March 12, 16, 1926). Also noted at San Salvador (March 28, 1912); Divisadero (September 30, 1925); San José del Sacare (March 11, 1927).

Status.—Common fall and spring migrant and winter visitant to suitable territory everywhere below 7,000 feet. Although confined to no particular life zone or association, it has its center of abundance along the cultivated foothills. Extreme dates of arrival and departure are September 30 and March 28.

Remarks.—Although every effort was made to secure small or dark-colored specimens from the numerous sparrow hawk population, not one example out of the twenty which were collected can be referred to any but the migratory North American race *sparverius*.

Swann in 1920,² under the name *Falco sparverius guatemalensis*, described a "resident race in Central America" which Griscom has recently shown³ to be based upon immatures of *sparverius*. In the same paper Griscom has named and properly characterized the dark-colored, diminutive form *Falco sparverius tropicalis* which is actually

¹ Bull. Mus. Comp. Zool., 69, p. 419, Oct. 1929.

² Syn. Accipitres, p. 156, 1920.

³ Amer. Mus. Novit., 414, pp. 1-2, March 24, 1930.

resident in and apparently confined to the pine regions in Central Guatemala. The present writers have examined the specimens in the Dwight collection upon which Griscom based the new race and endorse his findings in every particular. We are also in complete accord with his comments as to the range and status of *Falco sparverius phalaena* (Lesson), namely that it is confined to the desert regions of the southwestern United States and northwestern Mexico. Its characters are pale, foxy-red coloration, large crown patch, and somewhat smaller size. Sparrow hawks from western North America, north of the range of *phalaena*, are so imperfectly and inconstantly distinguished from eastern *sparverius* as to render futile any attempt at separation.

The first migratory flight of the fall was seen at Divisadero on the evening of September 30, 1925, when a straggling group of about twenty sparrow hawks was seen flying due east at a height of some 500 feet. Immediately after this date the species became common, but by the middle of October the migration was at an end. Birds remaining after that time constituted the fixed winter population. The northward movement begins about March 1, but the manner of departure is less conspicuous than is the arrival in the fall. As a general rule birds which had been present in definite areas during the winter were simply found to be missing from their customary lookout perches. The only spring flight of sparrow hawks to be noted was at San Salvador on March 28, 1912, when a score or more birds were seen flying northwest.

The probability that some form of sparrow hawk breeds in El Salvador is not a remote one, for the rolling pine country along the cordilleran foothills appear to offer every inducement for the permanent residence of the species. A pair of birds was seen about an old pine stub between San José del Sacare and La Palma on March 10, 1927, but since it was not possible to collect them, their identity is unknown.

Order GALLIFORMES. Gallinaceous Birds

Family CRACIDAE. Curassows, Chachalacas, and Guans

Ortalis leucogastra (Gould). WHITE-BELLIED CHACHALACA. CHACHA.

Penelope leucogastra Gould, Proc. Zool. Soc. Lond., 11, p. 105, Dec. 1843—"Hab.—?" (probably either La Unión, El Salvador, or Realejo, Nicaragua). Proposed as a new species from a specimen brought by the *Sulphur*, not as a substitute name for *Penelope albiventer* Lesson (nec. Wagler).

Ortalis leucogastra Grant, Cat. Birds Brit. Mus., 22, p. 514, 1893—La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 281, 1903—La Libertad.

Ortalis vetula leucogastra Peters, Birds of the World, 2, p. 19, 1934—El Salvador.

Specimens and records.—Lake Olomega, 1; Puerto del Triunfo, 3; San Sebastián, 6; Rio San Miguel, 1; Lake Chanmico, 1; Lake Guija, 1; Hacienda Zapotitán, 1; Barra de Santiago, 2. Recorded from La Libertad.

Status.—Common resident of wooded areas below 1,500 feet in the Arid Lower Tropical Zone. The center of abundance is on the coastal plain.

Remarks.—The only places touched by the *Sulphur* and *Starling* whence the type of *Penelope leucogastra* could have come were Realejo (= Corinto), the Gulf of Fonseca, and La Libertad. At the last-named place stops were short, usually simply for the purpose of picking up mail, while the other two were bases for more or less lengthy sojourns for the purpose of making surveys. The ships were in Fonseca Bay almost continuously from November 19 to December 30, 1838. Our base while there was near Chiriquín Point, and from that place trips were made to various islands and to many nearby mainland points such as the Volcano of Amapala (= Conchagua) and San Carlos (= La Unión). Some hunting and collecting of birds was done here, for Captain Belcher says, "I . . . killed some wild ducks. Wild turkeys were shot for the table and several handsome varieties of small birds for the collection." Therefore, it is possible that La Unión is the type locality of this species.

Unlike their larger relatives, chachas are not averse to cultivated tracts. In fact they may be said to favor the vicinity of small villages and isolated huts in preference to more primitive places. At Puerto del Triunfo they were much more common within a mile or two of the village than they were in the more distant jungle. The "backyard" of our quarters at that place—an abandoned hotel on the equally abandoned main street—was a dense patch of tall jungle with a thick undergrowth of coyol palm. This piece of perhaps twenty acres was surrounded on all sides by open fields and on three by occupied huts, yet there were at least ten chachas living there. Although considerable shooting was done, they never left the locality and every evening at dusk could be seen flying to roost in a big, spreading tree. Altogether it is apparent that chachas are entirely capable of taking care of themselves and will doubtless survive for many years after *Craz* and *Penelope* have become extinct locally.

The preferred habitat is swampy jungle with coyol-palm undergrowth although in the hill country about Lakes Guija, Olomega, and Chanmico they took readily to thick, second-growth scrub and were almost as common there as in the coyol swamps. Chachalacas are partly arboreal, partly terrestrial, but escape is invariably by flight. The first flurry takes them, when surprised on the ground, into the thickest available tree, through whose smaller branches and protecting vine mat they slip to the farther side and then leave with surprisingly noiseless flight.

The loud, ringing calls of the males are most often heard in the early morning between dawn and sunrise. The first bird to begin will usually start every male in the neighborhood, and the woods for an hour or more resound with their crowing. The long, extraordinary trachea, the loop of which reaches nearly to the end of the sternum, produces a volume and power which remind one of the bugling of a crane, and a full-voiced old male can be heard a mile away. The three-or-four-note crow or bugle, when softened by distance, has a ringing, semimetallic quality. It is one of the longest-to-be-remembered forest sounds, and its recollection recalls more clearly than any other memory the palm swamps and mangrove-fringed lagoons where it was most often heard.

Nesting.—A female taken at Barra de Santiago April 15, 1927, was laying. A nest found at Lake Guija May 28, 1927, contained three white, and exceedingly rough-shelled eggs which were on the point of hatching. This nest was placed conspicuously thirty feet from the ground in a tall, slim sapling which rose above the surrounding brush. It was in a triple crotch, and in size, appearance, and structure was very similar to a crow's nest. The center was rather shallow, more saucer-like than cupped, and the eggs were lying on a lining of flattened leaves. Two half-grown young were taken July 26, 1912. Salvin and Godman,¹ however, found fresh eggs and newly hatched young in March in western Guatemala and state that two eggs constitute the ordinary number.

Plumage notes.—Two half-grown young taken at San Sebastián on July 26, 1912, had not only lost all trace of down, but were rapidly losing the juvenal plumage. The juvenal body plumage is essentially like the adult in color and pattern but is more lax and fluffy, and the remiges and rectrices are narrow and pointed. The postjuvenal plumage is distinguishable from the adult only by the rectrices,

¹ Biol. Centr.-Am., Aves, 3, p. 282, 1903.

which are narrower, being about 30 instead of 40 to 45 mm. wide. There is a complete annual molt in the fall, the time of which varies with different individuals from the middle of August to the end of December. The tail is not molted all at once, but a feather or two at a time, and consequently there is usually a noticeable difference in the ages of the tail feathers of the same individual.

Colors of soft parts. Adults, sexes alike: bill, slaty or plumbeous, darker basally; iris, dark brown or hazel; tarsi and feet, plumbeous or slaty plumbeous; orbital skin and cere, dark slate color; gular skin, reddish flesh-color.

Stomach contents. Berries and fruit, either green or ripe, but preferably coyol palm dates when these are available. Leaves or buds are apparently seldom eaten and berries or small fruit, of which there is a year-round supply of one sort or another, seem to constitute practically the whole diet.

***Penelopina nigra nigra* (Fraser). GUATEMALA BLACK CHACHALACA. CHACHA NEGRA.**

Penelope niger Fraser, Proc. Zool. Soc. Lond., 18, p. 246, 1850—"Hab.—?" (—Guatemala).

Specimens collected. Cerro del Aguila, 1 (May 19, 1927).

Status. Probably at one time fairly common in the cloud forests of the coastal volcanoes, but now extinct except on Volcán de Santa Ana and closely adjacent peaks.

Remarks. Though only one specimen was collected, other individuals were heard, and an occasional bird was seen on Cerro de Los Naranjos and also on the main cone of Volcán de Santa Ana. Various people said that black chachalacas were formerly not uncommon on Volcán de San Salvador, Volcán de San Vicente, and Volcán de San Miguel, but the birds are now presumably extinct on all these mountains. A native hunter on Volcán de San Miguel, on being shown a tree partridge (*Dendrotyx*), at once said that a year or so previously he had shot a much larger species and described fairly accurately a female black chachalaca. It is possible, therefore, that a very few are still to be found on that mountain.

The single specimen is assigned to the subspecies *nigra* somewhat arbitrarily, partly because it has a greenish, rather than a bluish, luster to the plumage and in this respect is like males from the Pacific cordillera of Guatemala, and partly because of the general Guatemalan affinities of the region where it was taken. Additional

material must be examined before the subspecific status of the black chachalacas on Volcán de Santa Ana can be finally determined.

Colors of soft parts.—Not recorded.

***Penelopina nigra dickeyi* van Rossem. DICKEY'S BLACK CHACHALACA.**

Penelopina nigra dickeyi van Rossem, Trans. San Diego Soc. Nat. Hist., 7, p. 364, May 31, 1934—Los Esesmites, Chalatenango, El Salvador.

Specimens collected.—Los Esesmites, 4 (February 23 to 26, 1927).

Status.—Fairly common resident of the cloud forest (Humid Upper Tropical Zone) on Los Esesmites.

Remarks.—The black chachalaca of the interior mountains of El Salvador differs from typical *nigra* chiefly in the color of the bare skin about the eye. In typical *nigra* it is bluish or purplish, while in *dickeyi* it is brownish red. The luster of the glossy black males is definitely bluish in tone. In this respect it is different from that of the greenish-hued males of the Pacific volcanoes of Guatemala, but whether or not these last are referable to typical *nigra* is doubtful.

The shrill, astoundingly human whistle of the male black chachalaca was one of the first sounds heard in the ravines of the cloud forest on Los Esesmites. It was one of the last birdcalls to be positively identified, for although collecting commenced there on February 1, it was the 23rd before a whistler was finally stalked and shot.

The habitat of *Penelopina nigra* is on the steep, heavily forested slopes and ravines of the wildest parts of the mountains, where the undergrowth of tree ferns, moss-covered fallen logs, and underbrush is densest (pl. XIX). In such situations males could be heard whistling at five-minute intervals all through early morning and late afternoon, each call answered by males in other ravines.

The first time a bird was seen, was on February 4, when a male jumped from the thickest part of the undergrowth in a ravine at 8,000 feet on the north slope. He could not be found again, for the cold, driving fog obscured everything beyond the range of a few feet. On the 23rd, Stirton stalked and shot a male which was whistling, just at dusk, in the same ravine. This bird was found in a low, thick-crowned tree, and when finally alarmed it attempted to escape by jumping and running through the branches. On the 25th another male was taken in a precisely similar situation, though an hour's still hunt was necessary to secure him. Both of these had their crops stuffed with round, hard, green berries about the size of hazelnuts.

The following, slightly amplified, notebook extract (van Rossem) gives all the data we have on courtship. February 26, 1927.—“About dusk I heard a *Penelopina* whistling from a ravine about half a mile away and went over, hoping to come up with him before complete darkness set in. While forcing through a dense area of second growth I came suddenly on a male (not the whistler) whirling round and round, for all the world like a dog chasing his tail. In the dark woods the bright orange-red of his throat and feet stood out plainly; in fact, had it not been for these colors I could hardly have made him out at all, even though the distance was less than twenty feet. He saw me in the midst of one of his whirlings and became utterly confused, once actually running toward me. Finally he jumped on a low branch, where I shot him. The female flew out of a low, vine-hung tree right over the place where he had been whirling and flew off across the ravine, apparently untouched by the shot sent after her. I went over to the place to which I had seen her fly, hoping she would take to a tree and be visible against the sky, for it was now practically dark, and by pure luck found her lying dead on a pile of leaves.” On dissection she proved to be in laying condition. A careful search the next day failed to disclose the nest.

As to roosting places: February 28, 1927.—“It appears that the black chachas roost in the highest pines; at least many of them do so. A short time after sundown we began to hear the curious, whirring rattle and saw, here and there, males flying from the ravine undergrowth to the pine tops. This noise sounds very much like a policeman's rattle and is given on a descending scale. One male started rattling the instant he left the undergrowth and ceased the moment he landed in the treetop, about 150 feet from the ground. The duration of the flight and rattle was only about two or three seconds, for he left the steep hillside almost at a level with the treetop. Once in the trees these birds were completely hidden, both because of the masses of parasitic growth and the poor light. I fired at the spot where one landed, at least 100 feet from the ground, but he flew out several feet from the place, and therefore must have moved about directly after alighting. I saw no females, nor more than a single male go to a tree.”

Nesting.—The natives say two or three white eggs are laid and that very often the nest is only a few twigs placed in the crown of a tall tree fern, but on this point nothing was learned by personal observation. The female taken on February 26 was laying.

Colors of soft parts.—Adult male: iris, dark, maroon-red; bill, gular patch with wattle, tarsi, and feet, between orange-red and coral-red; ocular space, dull, brownish red, lower eyelid pale; claws, reddish brown. Adult female: iris, reddish brown; tarsi and feet, dull, brownish red; bill, dull brown; ocular space, dusky; lower eyelid, dusky pink; gular skin, salmon pink; claws, dull, brownish red, slightly darker than toes.

Penelope purpurascens purpurascens Wagler. MEXICAN PENELOPE. PAVA.

Penelope purpurascens Wagler, Isis, p. 1110, 1830—Mexico.

Specimens collected.—Puerto del Triunfo, 2 (January 12, 1926).

Status.—Fairly common, locally, in uninhabited parts of the jungle near the seacoast, though formerly common everywhere in the coastal jungle and even into the lower foothills. Its total extinction within the boundaries of El Salvador is only a matter of time.

Remarks.—The introduction of modern firearms together with increased hunting has written almost the final chapter in the local history of these magnificent game birds. Old hunters testify to the great flocks which once ranged over the coastal jungle and the Colinas de Jucuarán and, even allowing for a great deal of exaggeration, it is evident that these birds were, in the not distant past, exceedingly common in favorable localities. Today they are very rarely encountered in the jungle on the seaward side of the Colinas de Jucuarán, and there are a good many left on the uninhabited peninsula of San Juan de Gozo which forms the sea arm of Triunfo Bay, but to the best of our knowledge these are the only two remaining localities where *Penelope* is to be found in El Salvador. A two-day hunt in the latter place resulted in the taking of two birds. San Juan is an exceedingly sandy peninsula about twenty miles long, bounded on one side by the sea and on the other by the tide channels of Triunfo Bay. It is scarcely more than a mile wide on an average and is simply a line of old sand dunes which have been elevated a few feet and covered with a rather thin, low jungle. Here pavas were fairly common, and several small flocks were seen, usually as conspicuous objects in some distant tall tree. Unfortunately, mid-January being the height of the dry season, the trees were mostly bare of foliage, and the ground was covered with a mat of dead, brittle leaves which made every step noisy. Two hundred yards was as close as such birds could be approached. José Morales, our native hunter, finally secured two by going to a tree where they had been found in

the daytime, covering himself with leaves before daylight, and knocking over two as they came flying in to feed. Their crops were stuffed with hard, green berries about the size of grapes.

Color of soft parts. Female (adult?): iris, dark red; facial skin, cere, and chin, blackish slate; bill, black; bare skin of throat, reddish flesh; toes and front of tarsi, dull, dark red; claws and back of tarsi, black.

***Crax globicera globicera* Linnaeus. GREAT CRESTED CURASSOW.
PAHUIL.**

Crax rubra Linnaeus, Syst. Nat., ed. 10, 1, p. 157, 1758—No locality (based on "The Red Peruvian Hen" of Albin).

Specimens and records.—Puerto del Triunfo, 1 (January 2, 1926). Also noted at Barra de Santiago; Colinas de Jucuarán.

Status.—Fairly common local resident in the coastal jungles and the foothills of the Colinas de Jucuarán. Like the last species this one has become much reduced in numbers in recent years.

Remarks.—While *Penelope purpurascens* kept to the more open, dry, sandy area along the peninsula, crested curassows were found only in the densest swamp jungle on the mainland. About two miles east of the village of Puerto del Triunfo is an area so boggy as to be in most places impassable. The jungle here grows to a height of about one hundred to one hundred and fifty feet, and the thick crown allows relatively little sunlight to filter through. Winding about the level, forest floor are small, sluggish streams which spread out here and there into mud sinks, sometimes of considerable area, their surface covered with head-high, big-leaved marsh growth. Between these bogs are small hummocks covered with a dense growth of coyol palms. In such swamps curassows have found a refuge, safe from molestation except when surprised in the less swampy places which are passable to hunters. In one place it was possible, by following a crooked tongue of firm ground, to penetrate some distance into the swamps, and from this point of vantage we several times saw single old males. Stirton once surprised a flock of a dozen females and young, as he was working a trap line down this higher ground, and instead of taking wing they all trotted into the cover of the swamp in a manner which reminded him of a flock of turkeys. Six steel traps baited with corn were set here, but with no results other than wandering opossums. Finally a single old male was secured by lying in wait near the edge of one of the streams, along the edge of which curassow footprints were much in evidence. At several other times

single old males flew up from the marsh, though always out of gunshot, perched a few moments in the lower branches of the trees, and then flew off deeper into the swamp. The flight is alternate flapping and sailing, and the wing beats are powerful and rather slow. Once the desired speed and direction are attained, they set the wings and coast for a long distance.

This species is not so intolerant of human habitations as is *Penelope*. When caught young the birds are easily tamed, and several such were seen about native huts at Puerto del Triunfo. They must be kept tethered, however, or otherwise confined, for they are said to destroy young domestic fowls at every opportunity.

The only notes we ever heard curassows utter were what can only be described as a low moaning. These unmistakable notes we heard one morning at daylight in the Colinas de Jucuarán back of Lake Olomega. At Barra de Santiago in April, 1926, footprints and occasional dropped feathers were seen in the jungle just back of the mangrove belt. These circumstances conclusively showed the species to be present there even though no call notes were heard nor birds themselves encountered.

Colors of soft parts.—Adult male: iris, brownish black; cere and basal one-half of mandible, bright yellow; bill, bluish white, horn color next to yellow skin of base; tarsi and feet, grayish blue; claws, flesh color; bare skin of facial and ocular region, dull black; lower eyelid, dull yellow.

Family PHASIANIDAE. Quails, Pheasants, and Peacocks

***Colinus leucopogon leucopogon* (Lesson). LESSON'S BOBWHITE. CODORNÍZ.**

Ortyx leucopogon Lesson, Rev. Zool., 5, p. 175, June, 1842—San Carlos, Americae centralis Oceani Pacifici (=La Unión, El Salvador); Des Murs, Icon. Orn., livre 6, pl. 36 and text, August, 1846—San Carlos

Colinus leucopogon leucopogon Dickey and van Rossem, Condor, 32, p. 72, January, 1930 (type locality; synonymy; range in El Salvador), Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 106, 1932—Salvador (crit.); Conover, Condor, 34, p. 174 in text, 1932 Salvador (crit.); Peters, Birds of the World, 2, p. 50, 1934—Eastern El Salvador.

Eupsychortyx leucopogon Gould, Mon. Odontoph., p. 13 and text, 1850—San Carlos.

Eupsychortyx leucopogon leucopogon Todd, Auk, 37, p. 203, part, April, 1920—San Carlos (discussion of type).

"*Ortyx albifrons* Less.," Lafresnaye, Rev. Zool., 5, p. 130, April, 1842—San Carlos, prov. de San Salvador (Nomen nudum).

Specimens and records.— Lake Olomega, 2; Rio Goascorán, 2; Divisadero, 21. Also noted at San Sebastián (Dept. La Unión); Volcán de San Miguel. Recorded from La Unión; Divisadero; Olomega; Rio Goascorán; and other points.

Status. Common resident of Arid Lower Tropical Zone grasslands, pastures, and cornfields in the southeastern corner of the republic and in the valley of the Lempa west probably nearly to Colima (fig. 14).

Remarks.— We regard it as extremely probable that *leucopogon* will be found to grade directly into *C. l. sclateri* of parts of southern

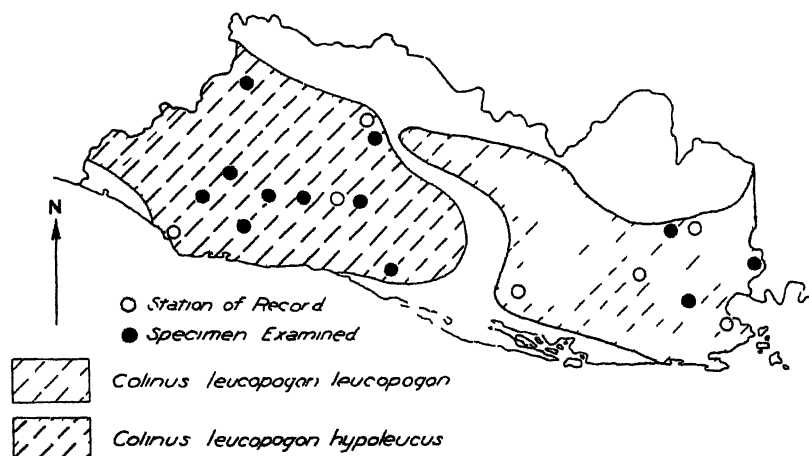


FIG. 14 Distribution of two races of the bobwhite, *Colinus leucopogon*, in El Salvador.

Honduras and western Nicaragua, for the chief distinction between the two is the color of the throat, a most variable character in *Colinus*. Certain points in Elliot's description of *Eupsychortyx leucofrenatus*¹ of Honduras suggest that his description was drawn from intergrades. The race *leucopogon* certainly occurs in Honduras along the lower course of the Rio Goascorán, for quail were seen on several occasions flying across this stream of only a few feet in width.

Although it was not possible to collect specimens either at San Sebastián or on Volcán de San Miguel, a flock of bobwhites was seen at each place under such circumstances that there is no doubt that they belonged to the present race and not to *C. l. hypoleucus*.

¹Ann. Lyc. Nat. Hist. New York, 7, p. 106, 1860. For change of name of the Pacific Nicaraguan race from *leylandi* to *sclateri*, see van Rossem, Bull. Mus. Comp. Zool., 77, p. 406, Dec., 1934.

Between Volcán de San Miguel and the Lempa River is a thirty-mile stretch of country from which no specimens were secured. Quail, unmistakably of this species, were heard whistling in the grasslands near Juiquilsco, but no trace of them was found in similar areas a short distance inland from Puerto del Triunfo.

It is probable that *leucopogon* in nearly typical form will be found to range west as far as the north and south course of the Lempa River and up the Lempa Valley for some distance. The series from Colima is, as a whole, closer to *hypoleucus*, but also contains individuals which are very close to *leucopogon*.

The first specimens of this long-lost quail (pl. I) were taken on September 24, 1925, during the second day of collecting at Divisadero (pl. XIV). A little flock of eight, most of which were half-grown young, ran out of a mimosa thicket and down a grass-grown trail for a few yards before turning again into the scrub. The two which were secured by a quick shot just as they were disappearing into the low growth were a female and a half-grown juvenile. Since the plumages represented are distinguishable from *hypoleucus* only on comparison, the real identity of these birds was unnoticed at the time. It was three days later, on September 27, before an adult male was shot as he rose from the grass which bordered a cornfield, and the true identity of these birds was then realized. From that time forward every attempt was made to secure a good series, but although quail were common and the males could be heard giving their "bobwhite" whistles all through the brush lands, only eight specimens were taken during the six weeks at Divisadero. The following spring, by enlisting the services of a local hunter, thirteen more were secured in this one locality.

By conservative estimate there were several hundred bobwhites within a radius of three miles of Divisadero, a locality in which they were probably more common than anywhere else in the country. The great expanse of practically forestless country thereabouts is, of course, the reason for their relative abundance in the region.

Nesting.—A half-grown juvenile, which was accompanied by the parents, was shot from a covey of similar sized birds on September 24, 1925. It is probable that this represents a second brood, for most young of the year had nearly finished the postjuvenile molt by dates only a little later. By the middle of April, 1926, most of the birds were in pairs, although by no means ready to breed, so it seems doubtful if nesting normally starts much before the middle of May at the beginning of the rainy season.

Plumage notes.---The molts of *leucopogon* do not differ in any respect from those of the well-known North American species. The annual molt of the adults and the postjuvenile molt of the young is ordinarily completed by the middle of October. There is also a limited spring molt, in both adults and one-year-old birds, which includes several rectrices.

Colors of soft parts. Adults: bill, black; tarsi and feet, bluish horn; iris, dark brown. Juvenile female: maxilla, mottled slaty and flesh color; mandible, flesh color; tarsi and feet, grayish flesh.

Stomach contents.—Always a greater or lesser quantity of sand or fine gravel. Small seeds, usually those of the "sacaton" bunch grass, and occasional small plant buds were the only food items noticed.

***Colinus leucopogon hypoleucus* (Gould). GOULD'S BOBWHITE.**
CODORNÍZ.

Eupsychortyx hypoleucus Gould, Proc. Zool. Soc. Lond., 28, p. 62, 1860—"Acajutla in Mexico" (—Acajutla, El Salvador); Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 297, 1903 Acajutla.

Colinus leucopogon hypoleucus Dickey and van Rossem, Condor, 32, p. 72, Jan., 1930—range in El Salvador (crit.); Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 106, 1932—Salvador (crit.); Conover, Condor, 34, p. 174, in text—Salvador (many localities; crit.).—Peters, Birds of the World, 2, p. 50, 1934—western El Salvador.

Specimens and records.—Colima, 10; San Salvador, 2; Miraflores, 1; Sonsonate, 2; Lake Chanmico, 5; Hacienda Zapotitán, 3; Hacienda Chilata, 1; Volcán de Santa Ana, 1; Lake Guija, 11. Also noted at Volcán de San Salvador; La Aldéa. Recorded from Acajutla and many of above localities.

Status. Common resident of Arid Lower Tropical Zone grasslands and cultivated areas west of the north and south course of the Lempa River (fig. 14).

Remarks. The unstable characters displayed by this race are difficult to account for. One's first impression on reviewing a combined series of fifty-eight specimens of *leucopogon* and *hypoleucus* is that the latter is primarily an albinistic race of the former (pl. I). Further consideration, however, shows that the matter cannot be disposed of thus easily. In the first place there is no evidence that the juveniles of either sex are ever other than "normal"; that is to say, the underparts and head are dark-colored. The transition from the juvenile plumage to the white underparts of the postjuvenile and adult plumages of the males is well shown by a half-grown bird

of that sex taken at Colima, in which white, postjuvenile feathers are appearing among the dark-juvenile plumage of the underparts. Again, females are normally dark-colored (only one out of the seven shows a few white feathers on the pectoral region) while *all* of the males are more or less white. Albinism, to use that term in its true sense, denotes an abnormal deficiency of pigment. A condition such as the present one, which is evident, even though variable, in one hundred per cent of the males is certainly not abnormal. After careful consideration we have come to the conclusion that *hypoleucus* exhibits two types of variation, to one or the other of which all races of the species are subject. The first of these is the *quantitative* type or difference in degree, which in most cases is correlated with, and which, either directly or indirectly, is most probably induced by, climatic conditions peculiar to the environment. This type of variation is represented in *hypoleucus* by the comparatively grayish tones in the females and by the dorsal plumage of the males, as compared with *leucopogon*. The second type of variation is *qualitative*, in which are shown absolute differences which by no stretch of the imagination could have been climatically induced, and which are most probably mutational in character. It is to this type that we ascribe the white underparts of *hypoleucus*. The case is similar in many respects to that of *Buarremon* with which Chapman has dealt¹ most exhaustively.

Probably because the western departments have been much more extensively cultivated than the region east of the Lempa, Gould's bobwhite is more common and more generally distributed than its relative of the Oriente. For example, it is almost certainly due to the clearing off of the forests on the slopes of the volcanoes of San Salvador and Santa Ana that *hypoleucus* has worked its way upward to an elevation as high as 5,000 feet on these two mountains, for the species is typically and normally an inhabitant of Arid Lower Tropical grasslands and thin, open woods with plenty of protecting undergrowth. The two localities in which *hypoleucus* was found to be most common were Colima and Hacienda Zapotitán, both in regions of extensive fields and pastures.

Nesting.—Laying evidently does not commence before about the end of May, for flocks are the rule up to that time. Although the young of the year are normally fully feathered by the latter part of September and most of the birds are by that time again gathered into flocks, a few continue to nest until well along in the fall, for

¹ Bull. Am. Mus. Nat. Hist., 48, pp. 243-278, 1923.

a half-grown juvenile was taken at Colima at so late a date as January 21.

Plumage notes. The sequence of molts is precisely like that in the *virginianus* group of bobwhites. In other words, the adult type of plumage is attained at the time of the postjuvenile molt. The spotted, juvenal primary coverts are, of course, retained until the first annual molt so that these feathers are a sure indication of age in spring and summer specimens. A series of ten males taken at Lake Guija at the time of the limited prenuptial body molt in late May shows that most of the young of the previous year become increasingly white at this time. Some old males apparently never become pure white below, and conversely an occasional young male in its first fall plumage will be found with underparts pure white. However, the tendency of *hypoleucus* to average whiter in the case of fully adult birds is too well demonstrated to be a subject for controversy.

Colors of soft parts.— As in *leucopogon*.

***Dactylortyx thoracicus salvadoranus* Dickey and van Rossem.**
SAN MIGUEL LONG-TOED QUAIL. PERDÍZ.

Dactylortyx thoracicus salvadoranus Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 129, 1928—Volcán de San Miguel, El Salvador; van Rossem, Trans. San Diego Soc. Nat. Hist., 7, p. 152, in text, July, 1932—El Salvador (crit.); Peters, Birds of the World, 2, p. 56, 1934—Volcán de San Miguel.

Dactylortyx thoracicus Grant (not *Ortyx thoracicus* Gambel), Cat. Birds Brit. Mus., 22, p. 429, 1893, part, Volcán de San Miguel; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 308, 1903, part, Volcán de San Miguel.

Specimens collected.— Volcán de San Miguel, 3 (March 19, 20, 1926).

Status.— Fairly common resident of the oak association of the Arid Upper Tropical Zone on Volcán de San Miguel. The vertical range is from 2,500 to 4,000 feet altitude.

Remarks. On Volcán de San Miguel during March, 1926, quail were sometimes flushed from the litter of leaves under the nearly leafless oaks on the southeast slope and were also, although rarely, found in the upper edge of the Lower Tropical Forest. In line with previous experience with this species on Mt. Cacaguatique, nearly all of these birds escaped by running swiftly through the deep leaves to the nearest brush tangle, and it was only by luck and accident that three specimens were collected. An occasional bird would lie close,

in the manner of *Cyrtonyx*, until it was almost stepped on, then with a quick whirr of wings it would disappear into the scrubby undergrowth.

Nesting.—On Volcán de San Miguel, during the latter part of March, 1926, these quail were invariably in pairs, and the three specimens collected were nearly ready to breed.

Plumage notes (including *D. t. taylori*). Adults and birds of the year were just completing the annual molt during December, 1925. The material at hand contradicts Ogilvie-Grant's supposition that the white throat of some males is a sign of immaturity. Of the two fully adult males from Mt. Cacaguatique one has a pure white throat and chin, while the other has the throat and chin brown, concolorous with the sides of the neck. The third male from that locality is a bird of the year, which although still retaining traces of the juvenal plumage has a solidly brown throat and chin. The single fully adult male from Volcán de San Miguel (type of *salvadoranus*) has the throat and chin brown while the other male, a bird of the previous year as shown by the two more pointed outer primaries and the spotted, juvenal primary coverts, has the chin and lower throat brown and the upper throat white. From the foregoing it appears probable that the male of this species has two color phases of the plumage of the throat, and that these are present irrespective of the age of the individual.

Colors of soft parts.—Adults: iris, brown; bill, blackish brown; tarsi and feet, plumbeous horn-color; claws, brownish horn-color. First fall: similar, but basal half of mandible paler than in adults.

***Dactylortyx thoracicus taylori* van Rossem. INTERIOR LONG-TOED QUAIL. PERDÍZ.**

Dactylortyx thoracicus taylori van Rossem, Trans. San Diego Soc. Nat. Hist., 7, No. 13, p. 151, July 28, 1932—Mt. Cacaguatique, Dept. San Miguel, El Salvador; Peters, Birds of the World, 2, p. 56, 1934—Mt. Cacaguatique.

Dactylortyx thoracicus salvadoranus Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 129, June 29, 1928—part, Mt. Cacaguatique.

Specimens collected.—Mt. Cacaguatique, 6 (November 27 to December 17, 1925).

Status.—Fairly common resident of the oak and coffee association of the Arid Upper Tropical Zone on Mt. Cacaguatique and probably of other interior areas.

Remarks.—On many parts of Mt. Cacaguatique the original undergrowth has been removed to make room for coffee bushes

(pl. XV). This change evidently has been a favorable one for these quail, for in such areas they show a decided tendency to favor the coffee groves instead of their natural habitat of oak scrub.

Long-toed quail are forest dwellers and do not habitually come out into the open. The dead-leaf pattern of the upperparts blends so perfectly with the ground litter of the woods that it is only very rarely that one is able to catch a glimpse of a bird before it dodges out of sight behind the nearest cover, or flushes with a disconcerting roar of wings from under foot. Even when the exact location of a flock is known, individual birds may be practically indistinguishable from their background so long as they remain motionless. All told, about fifty of these birds were seen on Mt. Cacaguatique, usually in small flocks of from four or five to a dozen. But, with birds of the secretive habits and inconspicuous coloration of the present species, seeing is one thing and collecting is quite another matter. The fact that Morales, an excellent still hunter, spent several days lying in wait and creeping about through the coffee in order to take four specimens is illustrative of the ability of this quail to take care of itself.

Colors of soft parts. As in *D. t. salvadoranus*.

Stomach contents. Although said by various people to be altogether too fond of coffee berries, the birds collected had in their crops only small seeds, insect remains, and what appeared to be fly larvae, plus, in all cases, a small amount of gravel.

Cyrtonyx ocellatus differens Griscom. HONDURAS OCELLATED QUAIL. PERDIZ PINTADA.

Cyrtonyx ocellatus differens Griscom, Proc. New England Zool. Club, 13, p. 56, November 7, 1932. Hatillo, Honduras.

Specimens collected. Los Esesmites, 4 (February 11 to 20, 1927).

Status. Fairly common but exceedingly local resident of the upper parts of the pine association in the Arid Upper Tropical Zone of the cordillera.

Remarks. This beautiful quail was found in February and March, 1927, in a limited area from 6,400 to 7,000 feet altitude at Los Esesmites. The typical habitat was a knee-high, dense growth of bracken which grew on the more open, sunny slopes in the pine belt, where the ground was cut in many places by small, steep-banked gullies with courses more or less choked by blackberry vines and similar tangle. In such an environment the ocellated quail was not

uncommon around our camp, for three small flocks of a dozen or so birds each were known to live within a radius of a mile. It is not improbable that these flocks were family groups which had remained together after the preceding breeding season, for at least some of the members had not, in late February and early March, fully completed the postjuvenal molt. However, both old and young were amply able to make hunting them a most discouraging proceeding. Like their congeners in Arizona they would lie so close that, until literally almost stepped on, their presence was not detected, and the sudden roar of wings with which they burst out from under foot was so startling that they might get clear away without a shot being fired.

Although this quail was personally met with only at Los Eses-miles, it not improbably inhabits other localities in the pine regions of the cordillera. Hunters at Ciudad Barrios on the western slope of Mt. Cacaguatique described a species which was said to be fairly common in the pines and which was evidently the ocellated quail.

Colors of soft parts.—Adult male: bill, black with mandible and maxillary rami pale blue; tarsi and feet, light blue (close to light delft blue); claws, horn color; iris, dark brown. Immature female: bill, blackish horn-color; mandible and maxillary rami, pale, light blue; tarsi and feet, bluish horn-color; iris, dark brown.

***Dendrortyx leucophrys nicaraguae* Miller and Griscom.**

NICARAGUAN TREE QUAIL. FAISÁN.

Dendrortyx leucophrys nicaraguae Miller and Griscom, Amer. Mus. Novit., 183, p. 1, July 18, 1925—Jalapa, Nicaragua.

Specimens and records.—Volcán de San Miguel, 1; Mt. Cacaguatique, 2; Los Esesmiles, 2. Also noted at San José del Sacare; Volcán de Santa Ana.

Status.—Fairly common resident of second growth and brushy areas in the higher mountains throughout the country. Although this tree quail occurs from the upper limit of the Arid Lower Tropical Zone to at least 8,000 feet in the Humid Upper Tropical Zone, its metropolis is in the Arid Upper Tropical oak association.

Remarks.—The five specimens secured are slightly redder than typical *nicaraguae*, thus showing an approach to *D. l. leucophrys* of Guatemala. They are, however, well within the measurements of the small, Nicaraguan race. There is the possibility that the birds on Volcán de Santa Ana are really *leucophrys*, for that locality is Guatemalan rather than Nicaraguan in its affinities. In the absence of specimens we can only include the record under *nicaraguae*.

Tree quail, the largest American members of their subfamily, are rather common, but their habits make them extremely difficult to collect and their rarity in collections is not surprising. On Mt. Cacagualique in November and December, 1925, a good many of these birds lived in a dense, almost impenetrable area of second growth which had reached a height of perhaps twenty feet and which was covered for the most part with a blanket of creepers and thorny vines. From this cover they occasionally ventured out into the coffee groves (pl. XV) to scratch among the deep litter. The specimen taken on Volcán de San Miguel in March, 1926, and the two on Los Esesmiles in February and March, 1927, were surprised as they were walking along trails through the brush. At San José del Sacare in March, 1927, a flock of several was found scratching in a litter of dead oak leaves in a patch of low-growing, deciduous oaks adjacent to a dense, brushy area.

While it is very difficult to gain much information concerning the behavior of these quail because of their secretive nature, it would appear that they habitually travel in small flocks which break up into pairs as the breeding season approaches. In December, on Mt. Cacagualique, a roosting tree was located and a trail cut to it. This tree, perhaps ten feet higher than the surrounding growth, was the gathering place every evening of a fair number of birds, possibly members of more than one flock, for the calls of the entire neighborhood, as dusk came on, finally converged toward this one spot. We attempted to secure specimens by waiting concealed under this tree, but only snap glimpses of one or two individuals were obtained in the course of several evenings of waiting. Their ringing calls remind one very much of the chachalaca, and the resemblance is further heightened by their semiarboreal habits.

Trapping was not successful as it was in the case of tinamous. Several group sets of a half-dozen steel traps were made at places where the quail had been seen, the traps carefully covered, and the ground about and over them liberally sprinkled with corn. White-fronted doves were frequently caught, but the quail, although shown by their footprints to have visited the traps time and again, failed to spring one.

In handling skins one fails utterly to gain a correct idea of this bird in life. It has a "long-legged" appearance with erect posture when unobserved, but on the least alarm will flatten out and dart away through the brush with rapidity and silence. The body is compressed laterally to a point equalled only by some of the rails,

and is thus well adapted for slipping through the close growing stems of its usual habitat.

Nesting.—No knowledge was obtained of the nesting of this form. The natives say that the nests are on the ground and that four or five eggs are laid. A female taken on Los Esesmites, February 24, contained an egg which had just entered the oviduct, but which was not sufficiently developed to show any shell characters. A female taken on Volcán de San Miguel, March 21, had finished the incubation period, and the largest ova were reduced in size to about 7 mm.

Plumage notes.—The annual molt seems to take place just after the breeding season, for the above-mentioned female, taken March 21, was in complete molt, including wings and tail. If there is a prenuptial molt, the two specimens taken on Mt. Cacaguatique November 30 and December 13, respectively, fail to show it.

Colors of soft parts.—Iris, grayish olive or yellowish hazel; bill, black; bare skin of ocular area, bright red, lower eyelid, flesh color; tarsi and feet, dull, brownish red or dark orange-red; feet, slightly darker. These slight differences do not seem to be correlated with sex or season.

Stomach contents.—Seeds and flower buds, 1.

Order GRUIFORMES. Cranes, Rails, and Allies

Family ARAMIDAE. Limpkins

***Aramus scolopaceus dolosus* Peters. CENTRAL AMERICAN LIMPKIN.**

Aramus pictus dolosus Peters, Occ. Pap. Boston Soc. Nat. Hist., 5, p. 144, January 30, 1925—Bolsón, Costa Rica.

Specimens and records.—Barra de Santiago, 1 (April 11, 1927). Also noted at San Sebastián (July 29, 1912).

Status.—Of rare occurrence in spring and summer (probably resident) in the mangroves and swamp forest along the coast.

Remarks.—At Barra de Santiago on April 11, 1927, a limpkin was shot as it was walking slowly, but very noisily, among the dead leaves of the forest floor. The association was the junction of mangroves with swamp forest (pl. XVI) and in the precise location where wood rails (*Aramides*) were most likely to be found. In carriage this bird was upright and reminded one in this respect of a white-faced glossy ibis. Another limpkin was seen at San Sebastián on July 29, 1912, when it flew up from a brackish forest marsh into the

trees above, where it perched for some moments before flying off into the woods.

Colors of soft parts. Non-breeding female: bill, yellowish flesh, darkening along entire ridge of culmen and on terminal third of both maxilla and mandible, to dull black; iris, brown; tarsi and feet, greenish slate; claws, blackish slate.

Family RALLIDAE. Rails, Gallinules, and Coots

***Aramides cajanea vanrossemi* Dickey. EL SALVADOR WOOD RAIL.**

Aramides vanrossemi Dickey, Condor, 31, p. 33, January, 1929—Barra de Santiago, El Salvador.

Aramides albiventris vanrossemi Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 120, 1932—Salvador (crit.).

Aramides cajanea vanrossemi Peters, Birds of the World, 2, p. 174, 1934—western El Salvador.

Specimens collected.—Barra de Santiago, 5 (April 3, 5, 6, 1927).

Status.—Fairly common in April, and presumably resident, in the mangroves and swamp forest at Barra de Santiago.

Remarks.—Although in the winter of 1925–1926 we searched carefully for birds of this genus in the apparently ideally suited swamp forest and mangroves at Puerto del Triunfo, no trace of them was found there. The mud along the borders of tidal lagoons and along forest streams produced not a single *Aramides* footprint, nor was the bird known to any of the local hunters. Morales, who is an excellent observer as well as hunter, never met with any during his years of hunting about Lake Olomega, nor did he ever encounter the species in the coastal jungle south of the Colinas de Jucuarán. Thus the available evidence indicates a wide gap between the range of this subspecies and that of the nearest member of the *plumbeicollis* group in western Nicaragua.

At Barra de Santiago in April, 1927, the presence of wood rails was detected on the very first morning of collecting in suitable cover (pls. XVI and XX), through the discovery of footprints on the muddy bottom of a shallow forest stream just at the junction of fresh and salt water. About sundown on the same day (April 2) a pair suddenly began cackling from the depths of a patch of mangroves, and a native hunter who had attached himself to the party during the day at once sent his two small dogs into the tangle. When the dogs reached the point from which the calls came, one of the rails jumped or flew up on the roots of a large mangrove where it was shot.

Although the tracks of wood rails were frequently seen in the mud of forest streams and under the mangroves at low tide, no more birds were seen until two days later when a pair were shot as they were walking together through the dead leaves on the forest floor close to the edge of a small stream. The carriage of these two birds was more erect than usual with rails; in fact it was almost heron-like, doubtless largely because of the disproportionately long legs. They showed the continual tail twitching common to the family. On the succeeding day a wood rail was seen poking about at the edge of some marsh growth just at the junction of fresh and salt water. When it was shot, its mate flew up on a nearby stub which projected several feet above the surrounding vegetation.

It is evident from the foregoing that *Aramides* has no reluctance about leaving the ground, the better to investigate suspicious sounds or objects, and also that in this locality the preferred habitat is the mingled mangrove tangle and marsh growth where fresh and salt water meet.

Nesting.—The specimens taken during early April showed that the breeding season was not far distant.

Colors of soft parts.—Adults: bill, yellow with terminal third apple-green; iris, eyering, edge of gape, legs, and feet, lake-red (between "rose red" and "pomegranate" purple); claws, dusky, reddish brown.

Stomach contents.—The stomachs of all five birds contained what appeared to be masses of vegetable matter, through which was mixed many tiny pieces of meat (probably of crustaceans) and some very small snail shells.

Porzana flaviventer woodi van Rossem. EL SALVADOR YELLOW-BELLIED RAIL.

Porzana flaviventer woodi van Rossem, Condor, 36, p. 243, No. 6, Nov. 15, 1934—Lake Olomega, El Salvador.

Specimens collected.—Lake Olomega, 2 (August 18, 1925; April 8, 1926).

Status.—Fairly common in fresh-water marshes in the lowlands of the Oriente, where breeding and probably resident.

Remarks.—On present-day evidence the Lake Olomega colony of yellow-bellied rails is separated from the geographically nearest relatives in the West Indies by some seven hundred miles and from the nearest mainland relatives (in the Magdalena Valley of Colombia)

by over a thousand miles. The presence in El Salvador of other marsh birds such as the West Indian races of the pied-billed grebe and the green heron indicates that the rails may be of similar origin.

These tiny rails were seen on several occasions at Lake Olomega before one was finally captured on August 19, 1925. As many as three on one day were observed, but their habits rendered them very difficult to secure. They frequented the knee-high growth of hyacinth which covered many acres of shallow water along the north shore, and about the only glimpses which were obtained of them were when they would flit up and drop almost immediately into the thick growth before there was time for a shot. None was seen in any association other than the hyacinth and mimosa tangle. No call-notes were heard which could positively be ascribed to this species. Characteristically rail-like, clicking notes were continually heard in this locality, but as *Laterallus ruber* frequented the same marsh, these notes may have come from that species.

Nesting.—Both of the birds taken are males; the one collected on August 19 was in breeding condition, while the other, taken April 8, showed no activity in this respect.

Colors of soft parts.—Adult male: bill, blackish olive or dark olive; iris, dark red; feet and claws, pale, dull yellow.

***Laterallus ruber ruberrimus* (Miller and Griscom). NICARAGUA
RED RAIL.**

Creciscus ruberrimus Miller and Griscom, Am. Mus. Novit., 25, p. 2, December 9, 1921—Jinotega, Nicaragua.

Specimens and records.—San Sebastián, 2 (July 29, 1912). Also noted at Lake Olomega (August 19, 1925; April 8, 1926); Hacienda Zapotitán (June 27, 1921).

Status.—Probably fairly common, but rarely seen, resident of fresh-water marshes in the lowlands, from near sea level to 1,500 feet.

Remarks.—The two individuals collected are best referred to the Nicaraguan form. They are a breeding pair which were taken with a set of five eggs on July 29, 1912. Both birds are smaller than the average for either *ruber* or *ruberrimus* in the wing measurements (74 mm. in both specimens), but abrasion is in part, if not entirely, the reason for this. The female is typical *ruberrimus* in color, while the male is only very slightly redder than *ruber*. They both possess the shorter and comparatively heavy bill of *ruberrimus*. Thus, on the basis of several characters they are really intermediate

between the Guatemalan and Nicaraguan races, which is natural enough considering that, geographically, El Salvador lies between these countries.

These little red rails are probably much more common than the few individuals seen would indicate, for they stay in dense marsh vegetation such as tule growth and hyacinth and flush only when nearly stepped on. At Lake Olomega they were found only in the tall, thick, water hyacinth and at San Sebastián only in an area where the tules grew more closely than usual. The two seen at Zapotitán were in *Scirpus* growth.

Nesting.—A nest containing five eggs found at San Sebastián on July 27, 1912, was eight inches above the water in the center of a small tuft of reeds. It was fairly well hidden except from directly above and was discovered when the bird flushed as the tuft was shaken in passing. This nest was built of strips of dried reeds and completely covered, the entrance being on one side. The shape was a nearly perfect dome both inside and out. The nest cup was rather shallow and lined with fine strips of grass. Below the cup the nest was quite damp and was alive with ants and their larvae and eggs. It measured eight inches in height by five inches wide outside, and four and one-half by three and one-half inches inside. It was left undisturbed until the 29th, but no more eggs were laid. The eggs, which have disappeared since 1912 and cannot now be located, were described in the notes of the day on which they were collected as "in shape, color, and markings duplicates of those of a clapper rail, but of course smaller."

***Porphyryla martinica* (Linnaeus). PURPLE GALLINULE.**

Fulica martinica Linnaeus, Syst. Nat., ed. 12, 1, p. 259, 1766—Martinique, West Indies.

Ionornis martinica Miller, Condor, 34, p. 11, January, 1932—Lake Olomega (nesting).

Specimens collected.—Lake Olomega, 8 (July 29, 1925; August 8, 14, 1925).

Status.—Common resident at Lake Olomega; detected at no other point.

Remarks.—All of the adults collected are paler throughout, are more extensively green above and have the outer webs of the primaries bluish green instead of greenish blue as compared to two adults from Dutch Guiana. Possibly a sufficient series of specimens would show the species to be subject to geographic variation.

The extreme localness of this species was surprising in view of the numerous localities which appeared to offer every inducement for its presence. Purple gallinules are apparently absent from the upland lakes and ponds, nor was any trace of them found in the extensive fresh-water marshes at San Sebastián near the mouth of the Lempa. The species was noted at Olomega in July, August, September, February, and April.

Nesting.—Water hyacinth was the characteristic marsh growth inhabited by this species, in fact it was never seen except in that association. Three nests found on August 1, 1925, were all placed in rank, tall growth of that plant. These three nests were made of grass and were placed about eight inches above the water. One contained three eggs pipped and one infertile; one, six fresh eggs; and one, two fresh eggs. They were open to the sky, but surrounded by tall stems and flowers of the hyacinth. It is interesting to note that the green of the back, the purplish blue of the head and neck, and the light blue frontal shield of the purple gallinule constitute protective coloration in the strictest sense when in a hyacinth association. A "hawk's-eye" view would have extreme difficulty in distinguishing the sitting bird among the mass of green leaves and hyacinth blue flowers. On August 14 a young chick was found which was about a week or ten days old, and on September 6 several young on the wing were noted. It is possible that more than one set of eggs a year is laid, and that these last-named young were from the first nesting. Very often when gallinules were flushed from the hyacinth, they flew to the nearest mimosa tangles where they alighted in the topmost twigs and remained in plain view for some moments before sliding through the thorns to the ground.

Plumage notes.—A female taken July 29 is mostly in juvenal plumage with only a few brighter-colored feathers here and there about the body. She had laid only a short time previously, so it is fair to assume that the species breeds before reaching maturity.

Colors of soft parts.—Downy chick at about ten days old: bill, basally to nostrils, dull red, followed by a band of black about 5 mm. in width, a subterminal band about $2\frac{1}{2}$ mm. wide of pale, dusky blue, and the terminal $2\frac{1}{2}$ mm. black; legs and feet, dusky orange-brown; iris, brown. Breeding adults: frontal shield, pale blue, sky-blue, or bright blue; bill, dark red, terminal, one-third greenish yellow; iris, reddish brown or dark red; legs and feet, greenish yellow or bright greenish yellow. The above variations are not sexual.

Stomach contents.—Stomachs contained a pulped mass of purely vegetable matter.

Gallinula chloropus cachinnans Bangs. FLORIDA GALLINULE.

Gallinula chloropus cachinnans Bangs, Proc. New Eng. Zool. Club, 5, p. 96, May 17, 1915—Arbuckle Creek, De Soto County, Florida.

Specimens collected.—Colima, 2 (January 21, 25, 1927).

Status.—Fairly common, but very local, midwinter visitant to fresh-water ponds in the interior.

Remarks.—The two specimens collected are not distinguishable in color or measurements from typical United States examples of this race. The Florida gallinule is well known to be resident in Central America, and Miller and Griscom have recently¹ believed that these resident birds were a distinct race. However, Peters² has been unable to distinguish the breeding birds of Panama from typical *cachinnans* and he considers *G. c. centralis* to be unrecognizable. Certainly neither of our two El Salvador skins show any of the characters ascribed to *centralis*, but it must be remembered that they are birds taken in winter and were most probably transients in the locality where found.

The marsh at Colima, an area of some 200 acres, harbored several gallinules other than the two which were taken, but they were so shy that only occasional glimpses of them were obtained as they appeared momentarily at the edge of the thick growth.

Fulica americana americana Gmelin. AMERICAN COOT.

Fulica americana Gmelin, Syst. Nat., 1, pt. 2, p. 704, 1789—North America.

Specimens collected.—Lake Olomega, 2 (February 27, 1922); Lake Ilopango, 1 (April 13, 1912); Lake Chanmico, 2 (May 16, 1912).

Status.—Common midwinter visitant and spring migrant to fresh-water lakes.

Remarks.—The five specimens taken average decidedly more slaty (less brownish) dorsally than California collected skins; in fact, they cannot be exactly duplicated even individually. Therefore, it is doubtful if they are migrants from western North America. The species has been recorded as breeding plentifully at Duenas³

¹ Amer. Mus. Novit., 25, p. 3, December 9, 1921.

² Bull. Mus. Comp. Zool., 71, p. 301, February, 1931; Birds of the World, 2, p. 204, 1934.

³ Biol. Centr.-Am., Aves, 3, p. 330, 1903.

in the Guatemalan highlands, and possibly these birds came from that region. The red-winged blackbird from the same general locality descends to the lowlands of El Salvador at times, and there is no reason why the mudhens should not also do so.

Mudhens were extremely abundant on all fresh-water lakes during the winter and spring, although they did not arrive until so late a date as February 27. The center of abundance is Lake Olomega, and there, in April, may be seen great rafts of hundreds of migrants. At Lake Chanmico a dozen or more were present up to at least May 19. A pair taken at that place on May 16 showed no signs of breeding, and probably they were nonbreeders which had not joined the northern flight.

Order CHARADRIIFORMES. Shore-birds, Gulls, Auks, and Allies

Family JACANIDAE. Jacanas

Jacana spinosa spinosa (Linnaeus). CENTRAL AMERICAN JACANA. GALLITO.

Fulica spinosa Linnaeus, Syst. Nat., ed. 10, 1, p. 152, 1758—"in America australi"—Cartagena, Colombia.

Jacana spinosa Miller, Condor, 33, p. 32, 1931—Lake Olomega (habits).

Specimens and records.—Lake Olomega, 17; San Sebastián, 8; Lake Guija, 2. Also noted at Puerto del Triunfo; Rio San Miguel; Colima; Acajutla; Hacienda Zapotitán; Sitio del Niño; Sonsonate (Miller). Recorded from Lake Olomega.

Status.—Common, locally abundant, resident of fresh-water streams, ponds, and lakes throughout the Arid Lower Tropical Zone. The center of abundance is on the coastal plain.

Remarks.—Shallow lakes with borders supporting a luxuriant marsh growth, slow-flowing rivers covered with floating rafts of water weeds and hyacinth, green-scummed rain pools and overflows, and thinly grown tule swamps are almost certain to provide temporary or permanent shelter for greater or lesser numbers of jacanas. The one requisite seems to be shallow, fresh, or at most brackish, water, on the surface of which there is sufficient vegetation over which the birds can walk or run (pl. XXIV). It is difficult to conceive of any bird more perfectly adapted to its environment than is the jacana, a generalization which does not fail to take into consideration the structural adaptations of such highly specialized forms as woodpeckers and grebes.

That the enormously developed legs and feet, which are so ideally suited to carry the birds over the thinnest sorts of floating water growths, are a relatively ancient character in the history of the race is indicated by the fact that their development in the newly hatched young is equal proportionally to that seen in fully adult birds. However, during the stages intermediate between hatching and maturity the legs and feet of the young reach even more grotesque proportions. A one-fourth grown chick which is still completely clothed in down has tarsi two-thirds and toes three-fourths the length of an adult of the same sex.

In general habits jacanas resemble rails except they are much less likely to resort to hiding and to slipping off quietly. As a rule they make little effort at concealment, but if pressed too close for safety will rise on fluttering, yellow-patched wings and after a short flight tumble awkwardly again into the marsh. Both sexes have a curious habit of frequently raising the wings vertically and holding them thus for a second or two, a trait which has also been frequently noted in the black-necked stilt. This act evidently has no sex significance for it is done at all times of the year. The movement appears to be entirely voluntary and almost invariably follows a short flight or run. The yellow secondaries are extremely conspicuous and advertise the presence of jacanas for distances at which a bird with folded wings would be nearly or quite invisible, so that the wing-raising habit may have some use as a recognition mark. As opposed to such a theory, however, is the fact that the identical practice is followed by the mockingbird, a solitary feeder, in whose particular case the gesture has been supposed to be for the purpose of startling into movement the insects for which it is searching. That the wing-raising of the jacana has any such utility we very much doubt.

Nesting.—During the first half of August, 1925, the jacanas' breeding season at Lake Olomega was drawing to a close, the last eggs were being laid, and young in all stages of growth were swarming over the floating vegetation along the north shore. This part of the lake was also the center of abundance of other marsh birds as well as for migrating shore birds and, therefore, it was visited frequently until a transfer of station was made late in September. The following notebook extracts (van Rossem) summarize the observations on the nesting of the jacanas in that locality.

August 1, 1925.—“Found jacanas nesting on detached, floating water plants about 100 feet from shore and where the water was from two to four feet deep. Several sets of eggs were found, all of four

eggs each, except for one incubated set of three and another of one fresh egg. Young, unable to fly, were also noted, from newly hatched to nearly full grown. The young reach nearly full body size before the wing quills are sufficiently developed for flight. There were also many white-breasted birds on the wing, products of (seasonally) earlier nesting. The adult males were very much concerned at our presence when young were about; the females very much less so, in fact, the latter seldom came closer to us than fifty yards. When eggs were found neither parent made the least disturbance, the male usually stealing off the nest while the boat was still some distance away. Eggs were laid on slightly saucered places on the wet weeds with no real attempt at nest building." (Several adults taken on this and earlier dates showed well-worn incubation patches on the flanks of the males and none whatever on the females.) August 8, 1925.--"Jacanas found as on previous dates, including fresh single eggs. We have seen no evidence to show that the females play the slightest part in the care of eggs or young. There are so many jacanas here that it is difficult to judge the actions of any individual bird, but certainly the females, easily distinguishable in life by their much larger size, show little or no concern. There is a notable tendency for undisturbed birds to pair off when feeding, but these may in some instances be newly mated pairs with laying still in progress." September 4, 1925.--"At this date many males are leading small young. Females are sometimes present, but usually retreat to a safe distance. The males go almost frantic in their efforts to lead one away." September 9, 1925.--"The high water from the river has raised the level of the lake nearly three feet in the last three days and, in consequence, many jacana families are taking an involuntary cruise as the rush of water tears loose whole rafts of vegetation. Several parties made up of three or four young and the male parent were seen well out in the lake. No females were on hand and it is probable that they had at once deserted their families when the rafts were torn loose from the original locations." September 10, 1925.--"Rowed up to one of the floating islands whereon was a male jacana and his three marooned chicks. The 'island' was a loose raft of water plants, under which it would seem impossible for anything to hide, but nevertheless the young disappeared from sight as we approached. The space they had to hide in was only about four feet in diameter, but we spent fifteen minutes in an almost leaf by leaf search with no result. Finally, just as we were starting away, something about the appearance of one of the tiny lily buds attracted my

attention. The 'lily bud' turned out to be the bill of a young jacana whose body was completely submerged except for the projecting bill which pointed straight up and really resembled a closed bud almost exactly. The eyes were open (that is, the nictitating membrane was not drawn) and the little fellow was easily seen once we knew where he was. But even with this as a guide we could not find either of the others. When we had pulled off twenty yards or so the male came back to the raft and the remaining young at once reappeared."

Plumage notes.—There is no evidence in the specimens at hand that this species molts more than once a year when fully adult. The white-breasted juvenal plumage is worn without change until the following April or May when the birds are about a year old. At that time a virtually complete molt, including the primaries, takes place. The primaries are shed progressively, the molt starting with the inner one and proceeding distally one at a time just as in most other shore birds. This first prenuptial molt results in a plumage which in its full development is not distinguishable from that of the adult, but normally a few juvenal feathers are held over. Some young birds do not attain this approximately adult plumage the first year, but continue on in ragged juvenal dress with only a scattering of brown or brown-tipped feathers mixed in with the body plumage. Although the juvenal stages are well illustrated in the series, there is not sufficient evidence to make any definite statement as to the time of the annual molt of the adults. It is strongly indicated that it takes place at the same time as that of the one-year-old birds.

Colors of soft parts.—Newly hatched chick: bill, pale, greenish yellow; legs and feet, greenish olive with edges of scales yellowish; claws, dusky; iris, dark brown. Fully grown juvenile: bill, orange-brown, bluish white laterally at base and reddish at base of shield; rudimentary wing spurs and frontal shield, yellowish green; legs and feet, olive-green, becoming olive-brown terminally on toes; iris, olive-brown. Breeding adults: bill, wing spurs, and frontal shield, waxy orange-yellow; skin at base of bill, pale blue; crus, olive; tarsi and feet, slaty green; iris, dark brown.

Stomach contents.—Aquatic insects, 1; seeds of water plants, 1.

Family CHARADRIIDAE. Plovers, Turnstones, and Surf-birds

Charadrius hiaticula semipalmatus Bonaparte. SEMIPALMATED PLOVER.

Charadrius semipalmatus Bonaparte, Journ. Acad. Nat. Sci. Phila., 5, p. 98, 1825—coast of New Jersey.

Specimens collected.—Lake Olomega, 2 (September 4, 1925); Puerto del Triunfo, 2 (December 31, 1925); Barra de Santiago, 1 (April 1, 1927).

Status. Very common in the fall, winter, and spring along the seacoast and inland at suitable localities. Dates of arrival and departure were September 4 and April 14.

Remarks.—Semipalmated plovers arrived at Lake Olomega during the night of September 3, 1925, for on the morning of the 4th they were fairly common everywhere about the lake shore. Both of the specimens taken on that date were young of the year. Next to the least and western sandpipers this species was the commonest shore bird present at Puerto del Triunfo during January, 1926; at Lake Olomega up to April 14, 1926, and at Barra de Santiago between April 1 and 13, 1927. At the last-named place these plovers were diminishing rapidly in numbers by the 13th; all were in breeding plumage and evidently on their way northward.

Charadrius wilsonia wilsonia Ord. WILSON'S PLOVER.

Charadrius wilsonia Ord, in Wilson's Orn., 9, p. 77, pl. 73, fig. 5, 1814—Cape May, New Jersey.

Specimens collected.—Barra de Santiago, 2 (April 2, 1927).

Status.—Detected only as a spring migrant along the seacoast.

Remarks.—Wilson's plover evidently works its way in limited numbers to the Pacific coast along with other eastern shore birds. It is not impossible that this race is also a winter visitant or fall migrant in El Salvador, for the Dickey collection contains three February-taken specimens from Punta Piedra on the Pacific coast of Costa Rica.

Charadrius wilsonia beldingi (Ridgway). BELDING'S PLOVER.

Pagolla wilsonia beldingi Ridgway, Bull. U. S. Nat. Mus., 50, pt. 8, p. 112, 1919—La Paz, Lower California. •

Specimens collected.—Puerto del Triunfo, 1 (January 5, 1926); Barra de Santiago, 2 (April 1, 2, 1927).

Status.—Midwinter visitant and spring migrant coastwise.

Remarks.—At Puerto del Triunfo in January, 1926, this species was noted as fairly common. Five or six individuals were seen daily, but there is the possibility that the same birds were encountered time after time for they were always in the same place on the mud flats near the town. They were not habitually in a flock, but occurred

singly or with aggregations of semipalmated plovers and western sandpipers.

During the spring migration at Barra de Santiago in April, 1927, the species was very much more common than during the winter and twenty or more birds were usually to be observed every day. Customarily they were in pairs or alone and were most frequently seen working along the edges of the lagoon channel at low tide.

Too few specimens were collected to allow of any estimate as to the relative numbers of the eastern and western races present.

Charadrius vociferus vociferus Linnaeus. KILLDEER.

Charadrius vociferus Linnaeus, Syst. Nat., ed. 10, 1, p. 150, 1758—South Carolina.

Oxyechus vociferus vociferus van Rossem, Condor, 29, p. 25, January, 1927—Salvador.

Specimens and records.—Puerto del Triunfo, 2 (January 14, 1926). Also noted at Lake Olomega (February 3 and April 6, 1926).

Status.—Winter visitant and common spring migrant to the lowlands. Dates of arrival and departure were January 1 and April 6.

Remarks.—At Puerto del Triunfo during January, 1926, killdeers were frequently heard as they flew overhead at night, but they were never found on the tide flats with other shore birds. About a dozen were seen on January 14 about a fresh-water pool in the jungle on the peninsula of San Juan de Gozo, just across the bay from Puerto del Triunfo. They were fairly common on the flats at Lake Olomega on February 3, 1926, and on April 6 at least one hundred were seen in the same locality. It may be remarked that not one was noted during the fall shore-bird migration at Lake Olomega, and there arises the interesting possibility of a different migration route at that season.

Squatarola squatarola (Linnaeus). BLACK-BELLIED PLOVER.

Tringa squatarola Linnaeus, Syst. Nat., ed. 10, 1, p. 149, 1758—Sweden.

Specimens collected.—Puerto del Triunfo, 2 (December 30, 31, 1925); Barra de Santiago, 1 (April 4, 1927).

Status.—Common winter visitant along salt water. Remains (rarely) in spring as late as April 5.

Remarks.—Black-bellied plovers were common at Puerto del Triunfo from December 30, 1925, to January 27, 1926, where they spent the interval of low tide on the mud flats in front of the town.

During high tide a few could usually be found in company with other shore birds on the dikes surrounding some old oyster "farms," but the bulk of the population probably took to the sea beach, for they were not found using the mangrove roots with the curlews and turnstones. At Barra de Santiago in April, 1927, they were rare, the majority having probably left for the north. A few single birds were seen April 4 and 5. One taken on the former date is just beginning to assume the summer plumage, this appearing first on the upper-parts, throat, and chest. All four birds taken are adult.

***Arenaria interpres morinella* (Linnaeus). RUDDY TURNSTONE.**

Tringa morinella Linnaeus, Syst. Nat., ed. 12, 1, p. 249, 1766—Coast of Georgia.

Specimens collected.—Puerto del Triunfo, 3 (December 31, 1925; January 5, 16, 1926).

Status.—Fairly common midwinter visitant to the seacoast.

Remarks.—Along the line of an old pier at the abandoned port of Puerto del Triunfo there had been dumped a binder of lava blocks which rose a couple of feet above the mud. These rocks, as well as the tie rods and lower members of the pier structure, were covered with a crust of small barnacles and sea weed. Almost any day throughout January, 1926, one could find there from one to half a dozen turnstones picking over the rocks or balancing along the steeply pitched rods. At high tide they roosted on mangrove roots to await the reappearance of the first mud flats or rocks. Occasionally they fed with other shore birds along tidal creeks and dikes.

With good series for comparison it is obvious that these birds cannot be referred to *A. i. interpres*. A series of midwinter birds from Punta Piedra, Costa Rica are, likewise, clearly *morinella*.

Family SCOLOPACIDAE. Woodcock, Snipes, and Sandpipers

***Capella delicata* (Ord). WILSON'S SNIPE.**

Scolopax delicata Ord, Reprint of Wilson's Amer. Orn., 9, ccxviii, 1825—Pennsylvania.

Specimens and records.—San Salvador, 1 (March 7, 1912). Also noted at Colima (January 21, 1927); Lake Olomega (February 3; April 7, 1926).

Status.—Fairly common midwinter visitant and spring migrant in suitable localities in the Arid Lower Tropical Zone. Extreme dates on which noted were January 21 and April 7.

Remarks.—The Colima and San Salvador records are those of single birds. However, Wilson's snipe was fairly common about Lake Olomega on the dates given above and probably occurs in fair numbers at other suitable places in the lowlands also.

Numenius hudsonicus Latham. HUDSONIAN CURLEW.

Numenius hudsonicus Latham, Index Orn., 2, p. 712, 1790—Hudson Bay.

Specimens collected.—Puerto del Triunfo, 2 (December 31, 1925; January 12, 1926).

Status.—Fairly common fall and spring migrant and winter visitant coastwise; of less common occurrence on fresh-water lakes inland. Extreme dates of arrival and departure were September 9 and April 13.

Remarks.—The first, fall curlews were seen at Lake Olomega on September 9, 1925, but this is the only inland record and it is possible that they arrived earlier on the coast. At Puerto del Triunfo (December 31, 1925 to January 27, 1926) a good many were seen on the mud flats at low tide. When the mud was covered completely these curlews rested on the mangrove roots where they seemed perfectly at ease and had no difficulty in perching or even walking along sloping stems. Occasionally birds were found poking about in dense thickets of mangrove roots some yards from the open flats, and more than one was shot by mistake for a large rail as it attempted to slip away through the maze. At Barra de Santiago they were still common on April 13, 1927, and further observation unquestionably would have shown them to be present at still later dates.

Actitis macularia (Linnaeus). SPOTTED SANDPIPER.

Tringa macularia Linnaeus, Syst. Nat., ed. 12, 1, p. 249, 1766—Pennsylvania.

Tringoides macularia Sharpe, Cat. Birds Brit. Mus., 24, p. 468, 1896—La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 378, 1903—La Libertad.

Specimens collected.—Lake Olomega, 4 (July 28; August 5, 15, 21, 1925); Puerto del Triunfo, 1 (January 5, 1926); San Salvador, 4 (March 13 and 14; April 17, 1912); Lake Chanmico, 1 (May 18, 1912). Also noted at Divisadero (September 25, 1925); Monte Mayor (October 5 to 9, 1925); Rio Goascorán, 13° 30' N. (October 25, 1925); Rio San Miguel (February 2, 1926); Colima (January 21, 1927); Los Esesmiles (February 16, 1927); Barra de Santiago (April 1 to 13, 1927); Lake Guija (May 23 to 30, 1927). Recorded from La Libertad (February 5 [1891]).

Status.—Present practically throughout the year along the coast and on streams and ponds from sea level to 6,000 feet.

Remarks. Although June is the only month in which spotted sandpipers were not noted, there is little doubt that observation in suitable localities would show them to be present throughout the year. Fall, winter, and spring are the seasons of greatest abundance, the advance guard of worn breeding adults arriving the last of July and followed shortly by young of the year. It is doubtful if many of these birds (certainly not the earlier arrivals) come from the Pacific states for, in the mountains of California, eggs may be found well along in July and the young would not be old enough to travel until September at the earliest. Those individuals remaining throughout the summer are, of course, nonbreeders and as a rule are obviously young of the previous year.

***Tringa solitaria solitaria* (Wilson). EASTERN SOLITARY SANDPIPER.**

Tringa solitaria Wilson, Am. Orn., 7, p. 53, pl. 53, fig. 3, 1813—Pocono Mt., Pennsylvania.

Specimens collected.—San Sebastián, 1 (July 27, 1912); Lake Olomega, 1 (August 8, 1925); Rio San Miguel, 1 (February 5, 1926). Also noted at Lake Olomega (September 4, 1925); Barra de Santiago (April 4, 1927).

Status.—Uncommon fall and spring migrant and winter visitant in marshy localities on the coastal plain. Extreme dates of occurrence were July 27 and April 4.

Remarks.—In addition to the specimens listed above, four birds, presumably of this race since they were in the company of the single specimen taken on that date, were seen at Lake Olomega on August 8, 1925; one was collected, but not preserved, in the same locality on September 4, 1925, and another was collected, but not preserved, at Barra de Santiago on April 4, 1927. This last-mentioned bird although recorded from a coastal locality was not on salt water, but was at the edge of a forest pool a short distance inland.

On the slender evidence of the few specimens of this species which were collected, the eastern race arrives and departs earlier than the western.

***Tringa solitaria cinnamomea* (Brewster). WESTERN SOLITARY SANDPIPER.**

Totanus solitarius cinnamomeus Brewster, Auk, 7, p. 337, October, 1890—San José del Cabo, Lower California.

Specimens collected.—Lake Olomega, 3 (September 5, 1925; April 8, 1926); San Salvador, 1 (April 25, 1912).

Status.—Detected only in fall and spring on fresh-water ponds and streams in the Arid Lower Tropical Zone.

Remarks.—Of a scattered assemblage of solitary sandpipers working along a rocky shore at Lake Olomega on September 5, 1925, the only two specimens taken were females of this race, both of them in juvenal plumage. The western form was not noted again until April 8, 1926, when one was collected in the same locality. This last bird and the one from San Salvador (April 25) were in newly acquired breeding plumage. Differentiation of the two races is most easily made by reference to the inner web of the outer primary which is freckled in the western form and immaculate in the eastern.

***Tringa melanoleuca* (Gmelin). GREATER YELLOW-LEGS.**

Scolopax melanoleuca Gmelin, Syst. Nat., 1, p. 659, 1789—Chateaux Bay, Labrador.

Specimens collected.—Lake Olomega, 1 (September 9, 1925).

Status.—Uncommon spring and fall migrant on fresh-water lakes in the lowlands.

Remarks.—Greater yellow-legs appeared commonly at Lake Olomega August 19, 1925, but were noted thereafter only on September 4, when a pair was seen, and on September 9, when one was taken. During the spring migration three were noted in the same locality on April 7, 1926.

***Tringa flavipes* (Gmelin). LESSER YELLOW-LEGS.**

Scolopax flavipes Gmelin, Syst. Nat., 1, pt. 2, p. 659, 1789—New York.

Specimens collected.—Lake Olomega, 2 (August 19, September 4, 1925); Puerto del Triunfo, 1 (January 14, 1926); Barra de Santiago, 1 (April 5, 1927).

Status.—Fairly common fall and spring migrant in the fresh-water lakes and ponds of the lowlands. Remains rarely through the winter. Dates of arrival and departure were August 19 and April 5.

Remarks.—The first fall arrivals were noted at Lake Olomega on August 19, 1925, and the species was fairly common there until September 9. At Puerto del Triunfo one was found on a brackish pool in the forest on January 14, 1926. This is the only winter record. In the spring migration their numbers are about equal to those in the fall, and lesser yellow-legs were found to be not uncommon at Lake

Olomega April 5 to 8, 1926. At Barra de Santiago one was seen April 4, and another April 5, 1927, at a brackish pond in the woods. This species is very much commoner than its larger relative.

Catoptrophorus semipalmatus semipalmatus (Gmelin).

EASTERN WILLET.

Scolopax semipalmatus Gmelin, Syst. Nat., 1, p. 659, 1789—New York.

Specimens collected.—Puerto del Triunfo, 2 (December 31, 1925; January 1, 1926).

Status.—Midwinter visitant coastwise.

Remarks.—These two specimens are apparently typical of the eastern race.

Catoptrophorus semipalmatus inornatus (Brewster). WESTERN WILLET.

Symphemia semipalmata inornata Brewster, Auk, 4, p. 145, April, 1887—Larimer County, Colorado.

Specimens collected.—Puerto del Triunfo, 1 (December 31, 1925); Barra de Santiago, 1 (April 2, 1927).

Status.—Common winter visitant and spring migrant coastwise. Not noted on fresh water at any season.

Remarks.—Too few specimens of the willet were collected to establish much beyond the fact that both eastern and western forms occur in winter. At Puerto del Triunfo they were common on the tidal lagoons between December 30, 1925 and January 27, 1926, and at Barra de Santiago between March 31 and April 13, 1927. A specimen taken at the latter place on April 2 is in practically complete nuptial plumage. A small flock of willets which may or may not have been of this race was seen flying northwestward about one-half mile off shore at La Libertad on April 29, 1926.

Erolia melanotos (Vieillot). PECTORAL SANDPIPER.

Tringa melanotos Vieillot, Nouv. Dict. d'Hist. Nat., 34, p. 462, 1819—Paraguay.

Specimens and records.—Lake Olomega, 4 (August 1, 29 and September 4, 6, 1925). Also noted at Barra de Santiago (April 4, 1927).

Status.—Abundant fall migrant to fresh water in the lowlands. Rare or accidental in spring. Dates of arrival and departure were July 28 and April 4.

Remarks.—Pectoral sandpipers were noted during the first day's collecting at Lake Olomega, July 28, 1925, but no specimens were taken until August 1. Singles and pairs were noted to the number of about twenty a day until September 4, when the species suddenly became very common. By September 6 they were fairly swarming and remained at this peak of numbers until the 9th, when the last observations were made. None was found at Puerto del Triunfo in January, 1926. The only instance of spring occurrence was when one was taken (and later accidentally lost) at a brackish pool in the jungle at Barra de Santiago, April 4, 1927. As in the case of the killdeer, it is possible that this species uses a different migration route in spring.

Plumage notes.—Adults taken August 1 and 29, and September 4 are still in summer plumage with, in each instance, a few scattered winter feathers appearing. Young taken August 29 and September 6 are in full juvenal plumage.

***Erolia bairdii* (Coues). BAIRD'S SANDPIPER.**

Actodromas bairdii Coues, Proc. Acad. Nat. Sci. Phila., 13, p. 194, 1861—Fort Resolution, Great Slave Lake, Mackenzie.

Specimens collected.—Lake Olomega, 1 (August 19, 1925).

Status.—Rare fall migrant on fresh-water lakes in the lowlands.

Remarks.—The single example was collected while in company with a flock of other small shore birds on the north shore of the lake.

***Erolia minutilla* (Vieillot). LEAST SANDPIPER.**

Tringa minutilla Vieillot, Nouv. Dict. d'Hist. Nat., 34, p. 466, 1819—Halifax, Nova Scotia.

Specimens collected.—Lake Olomega, 3 (August 8, September 4, 1925); Puerto del Triunfo, 2 (December 31, 1925; January 8, 1926); Barra de Santiago, 2 (April 1, 2, 1927).

Status.—Common in fall, winter, and spring on suitable bodies of water in the lowlands and along the coast. Extreme dates of arrival and departure were August 1 and April 13.

Remarks.—At Lake Olomega the first least sandpiper was seen on August 1, 1925; on the 7th several more were noted, and by the 19th they had become fairly common. In midwinter (December 31, 1925 to January 27, 1926) at Puerto del Triunfo they were abundant. At Lake Olomega they were common on April 5, 1926, but in decidedly fewer numbers than at the same place during the fall. At Barra de Santiago they were rather common between April 1 and 13, 1927.

Plumage notes.—The two specimens taken August 8 are males in full, though very worn, breeding plumage. An adult female taken September 4 has completed the fall molt and is in gray winter plumage except for scattered body feathers and the four outer primaries in each wing. The two birds from Barra de Santiago are just commencing the prenuptial body-molt.

***Limnodromus griseus griseus* (Gmelin). EASTERN DOWITCHER.**

Scolopax grisea Gmelin, Syst. Nat., 1, pt. 2, p. 658, 1789—Long Island, New York.

Specimens collected.—Puerto del Triunfo, 6 (December 31, 1925; January 16, 1926).

Status.—Common midwinter visitant along the seacoast.

Remarks.—Dowitchers were very common at Puerto del Triunfo in January, 1926, where they ranged the mud flats in company with other shore birds. No trace of them was found during the spring and fall migrations on either fresh or salt water.

Although several birds besides those preserved were shot, all were clearly of the shorter-billed, eastern race.

***Ereunetes pusillus* (Linnaeus). SEMIPALMATED SANDPIPER.**

Tringa pusilla Linnaeus, Syst. Nat., ed. 12, 1, p. 252, 1766—Santo Domingo, West Indies.

Specimens collected.—Puerto del Triunfo, 2 (December 31, 1925; January 6, 1926).

Status.—Detected only as a midwinter visitant to the seacoast.

Remarks.—*Ereunetes pusillus* is relatively much less common than *E. mauri*, for the two specimens listed were all that came under observation in spite of the careful scanning of many flocks of small shore birds. Both specimens were collected on the mud flats in front of the village, a locality where *mauri* was present in large numbers. While there is every probability that *pusillus* occurs inland along with other small shore birds, its detection anywhere is very much a matter of chance.

***Ereunetes mauri* Cabanis. WESTERN SANDPIPER.**

Ereunetes mauri Cabanis, Journ. für Ornith., 6, p. 419, 1856—Cuba.

Specimens and records.—Puerto del Triunfo, 2 (December 31, 1925; January 6, 1926); Barra de Santiago, 1 (April 1, 1927). Also noted at Lake Olomega (August 18 to September 22, 1925; April 8, 1926); Barra de Santiago (March 31 to April 13, 1927).

Status.—Abundant fall and spring migrant and winter visitant in the lowlands and along the coast. Extreme dates when noted were August 18 and April 13.

Remarks.—During the fall shore-bird migration of 1925, western sandpipers appeared at Lake Olomega in limited numbers on August 18 and thereafter became increasingly common. With the exception of the least sandpiper this was the commonest shore bird present at Puerto del Triunfo in the winter of 1925-1926. The actual time of departure for the north in the spring is undoubtedly later than April 13, for on that date these sandpipers were still abundant, in 1927, at Barra de Santiago.

Tryngites subruficollis (Vieillot). BUFF-BREASTED SANDPIPER.

Tringa subruficollis Vieillot, Nouv. Dict. d'Hist. Nat., 34, p. 465, 1819—Paraguay.

Specimens collected.—Lake Olomega, 1 (August 19, 1925).

Status.—Rare fall migrant in the lowlands.

Remarks.—The above specimen, taken by Alden Miller, was shot from a mixed assemblage of least, western, and pectoral sandpipers on the muddy lake shore.

Crocethia alba (Pallas). SANDERLING.

Tringa alba Pallas, in Vroeg., Cat. Adumbr., p. 7, 1764—coast of North Sea.

Specimens collected.—Puerto del Triunfo, 2 (January 14, 1926); Barra de Santiago, 1 (April 4, 1927).

Status.—Common midwinter visitant and spring migrant along the coast.

Remarks.—Sanderlings were first observed at Puerto del Triunfo on December 31, 1925, and were noted as common at that place all during January. They were still fairly common on April 13, 1927, at Barra de Santiago, though in lesser numbers than during the first part of the month.

Family RECURVIROSTRIDAE. Avocets and Stilts

Himantopus himantopus mexicanus (Müller). BLACK-NECKED STILT.

Charadrius mexicanus Muller, Natursyst. Suppl., p. 117, 1776—Mexico.

Specimens collected.—Lake Olomega, 3 (August 19, 1925).

Status.—Abundant fall and spring migrant and winter visitant to fresh-water lakes and ponds in the lower country. Rare or casual on salt water. Extreme dates of arrival and departure were August 18 and April 6.

Remarks. - Although the first arrivals reached Lake Olomega on August 18, 1925, stilts did not become common there until September 9. At Puerto del Triunfo they were common about a brackish pool in the forest on January 14, 1926, and the same day a few were seen on a nearby salt-water estuary. February 3, and April 5 and 6, 1926, they were swarming about the shores of Lake Olomega. None was noted on salt water at Barra de Santiago in April, 1927.

Family PHALAROPODIDAE. Phalaropes

***Steganopus tricolor* Vieillot. WILSON'S PHALAROPE.**

Steganopus tricolor Vieillot, Nouv. Dict. d'Hist. Nat., 32, p. 136, 1819—Paraguay.

Specimens collected.— Lake Olomega, 3 (September 6 and 9, 1925).

Status.—Rare fall migrant on fresh water in the lowlands.

Remarks.— The two dates listed above are the only ones on which this species was noted. All three specimens were birds of the year in nearly complete winter plumage. They were, in each case, in company with small flocks of pectoral sandpipers.

Family BURHINIDAE. Thick-knees

***Burhinus bistriatus vigilans* van Rossem. CENTRAL AMERICAN THICK-KNEE. ALCARAVÁN, PERETETE.**

Burhinus bistriatus vigilans van Rossem, Bull. Mus. Comp. Zool., 77, No. 7, p. 388, Dec., 1934 — Hacienda El Pelón, Guanacaste, Costa Rica.

Oedicnemus bistriatus van Rossem (not *Charadrius bistriatus* Wagler) Condor, 29, p. 25, January, 1927 —Salvador.

Specimens collected. Lake Olomega, 2; El Carmen, 1; Pasaquina, 1; Colima, 5.

Status.—Fairly common, but very local, resident of the plains and lower foothills in the extreme southeastern part of El Salvador, and thence northwestward up the valley of the Lempa River at least as far as Colima.

Remarks.—These large shore birds were probably originally confined to the semi-barren *huacal* (*Crescentia cujete*) plains, which occur in the Oriente and the lower foothills of the cordillera from Colima eastward. While in a general sense this same area is still the range

of the alcaraván, the amount of ground suitable to the needs of the species has been materially increased by the conversion of one-time forested tracts into cattle pastures and fields. A typical *huacal* plain is level or gently rolling ground, usually more or less stony, dry, and with little vegetation other than the low, sparsely foliated trees, from which it derives its name, a thin growth of wiry grass, and isolated patches of minosa or acacia scrub. Due to the sterility of the soil the encroachments of civilization, which have so vitally affected more fertile districts, have altered the *huacal* plains little or not at all, and there the birds may be found in fair numbers at all times of the year. In localities where adjoining areas have been cleared and put under cultivation, as for example at Colima, where the richly silted Lempa River contacts for some distance the *huacal* plain of the lower cordilleran foothills, the newly opened fields have been readily accepted as suitable territory.

The large size of these birds, which in general bearing resemble gigantic plovers, coupled with the relatively open nature of their natural habitat would, one could imagine, render them more or less conspicuous under ordinary circumstances. However, such is not the case, for their concealing coloration, combined with excessive wariness, makes them one of the most difficult of birds to hunt or even to see during the daytime. It is only by hunting at night that one can get a fair idea of their numbers. Most of their activity occurs after dark, and then they feed freely on open ground with frequent short flights from place to place and with a great deal of calling back and forth. There is then no particular difficulty in approaching to within thirty or forty yards provided one uses a reasonable degree of caution. Detection, once one has located a flock in a general way, is easy, for the eyes of these birds are visible for long distances and appear as bright red points when caught by the beam of a hunting lamp.

At most times of the year small flocks of five or six birds are usual. The maximum number encountered in one flock was at Colima, when about twenty were found one night feeding in a cut-over field of sugar cane. As the breeding season approaches, the flocks commence to break up, and by the middle of February pairs are almost invariable.

Alcaravanes are extremely vocal at night and their loud, piercing cries begin at the least suspicious noise. This characteristic has resulted in their being kept as watch birds in some native establishments where, in addition to their police duties, they are said to be very valuable in destroying numbers of small scorpions and other

vermin. The usual method of securing such birds is to hatch the eggs with a hen as foster mother, but wild young are run down and caught while still unable to fly. While the raising of the young can hardly be dignified by calling it an industry, nevertheless, one can usually find one or two vendors with a cage full of disconsolate looking alcaravanes wandering about the streets of La Unión or San Miguel. The current price is about two dollars gold each. The remarkable thing about these domesticated birds is their absolute fearlessness, a strange contrast indeed to the excessive wariness of the wild ones. One infers that this thick-knee is not naturally a shy bird, but that continued persecution has made it so.

Nesting.—The natives say that two eggs are laid and that the shallow depression in the ground which forms the only nest is usually situated in the open so that the sitting bird may command a view to all sides. However, we have no first-hand knowledge on this point. A mated pair which was shot at Lake Olomega on April 7, 1926, had finished breeding and probably had young somewhere about. These birds sprang up almost from under foot and were shot as they raced away through the short grass at truly amazing speed. Dissection showed the female to have laid some time before this date, and further examination showed that the male had done most, if not all, of the duties of incubation, for his sides were bare of feathers and well developed "incubation patches" were present. There was no trace of such a condition in the female. Females taken in late January, 1927, at Colima had the largest eggs in the ovaries developed to about 2 mm., thus indicating that the breeding season was still some weeks distant.

Colors of soft parts.—Adults: bill, dull black, fading to pale yellow or olive-yellow on extreme base of maxilla and basal half of mandible; edge of gape, pale, dull, olive-yellow; iris, varying from bright yellow to greenish yellow; legs and feet, dull, greenish yellow; claws, dark brown.

The iris of this bird has remarkable contractile powers. In the bright sunlight the pupil shows only as a small black dot, and the broad yellow iris produces a sullen or angry appearance. At night the iris appears only as a narrow, yellow ring.

Stomach contents.—Four stomachs contained grass stems and plant buds with the addition, in one case, of numerous insect remains. Domesticated birds are omnivorous and will even swallow small metal objects such as thimbles. In a wild state, their food probably is varied.

Family LARIDAE. Gulls and Terns

Larus delawarensis Ord. RING-BILLED GULL. GAVIOTA (all species of gulls).

Larus delawarensis Ord, in Guthrie's Geog., 2d Am. ed., p. 319, 1815—Delaware River, near Philadelphia, Pennsylvania.

Specimens collected.—No specimens.

Status.—Rare midwinter visitant coastwise.

Remarks.—At Acajutla on January 13, 1927, five individuals of this species were seen flying about the ship and feeding on refuse from the galley. There were two adults and three young of the year, and identity of the gulls was based primarily on the old birds, which were examined through field glasses at distances as close as twenty-five feet.

Larus atricilla Linnaeus. LAUGHING GULL.

Larus atricilla Linnaeus, Syst. Nat., ed. 10, 1, p. 136, 1758—Bahamas; van Rossem, Condor, 31, p. 142, 1929—El Salvador.

Specimens and records.—No specimens. Noted at Acajutla (January 13, 1927). Recorded from Acajutla (January 26, 1931).

Status.—Sporadically abundant in midwinter and spring along the seacoast.

Remarks.—On April 22, 1926, a gull of this species was examined at San Salvador, where it was kept in a small aviary at the local race track. It was a broken-winged bird picked up at La Libertad "about a week" before and was in black-headed, spring plumage. At Acajutla on January 13, 1927, a flock of about 200 stayed about the ship all day. It is well known that small gulls appear at Lake Olomega during the winter and spring months, but none was met with personally and the species is in doubt.

J. H. Fleming has called our attention to a note in "Items of Interest" (No. 119, April 6, 1931), a mimeographed bulletin issued by the Massachusetts Department of Agriculture, concerning the recovery of a laughing gull at Acajutla on January 26, 1931. This bird had been banded at Muskeget Island, Massachusetts, on July 13, 1930. Here is positive proof of a crossing from the Atlantic to the Pacific Ocean.

At San José de Guatemala on April 30, 1926, a flock of two hundred or more came from the south about dusk and remained bedded near the boat all night. This occurrence is mentioned only as supplementary data, San José being only a few miles from the El Salvador-Guatemala boundary.

Larus pipixcan Wagler. FRANKLIN'S GULL.

Larus pipixcan Wagler, Isis von Oken, 24, Heft 5, col. 515, 1831—Mexico.

Specimens collected.—None.

Status.—Locally abundant midwinter visitant on the coast.

Remarks.—The only occasion on which this species was noted was on January 13, 1927, when about a hundred Franklin's gulls were associated with other species in salvaging garbage thrown from the ship on which van Rossem was a passenger. The locality, La Libertad, is only a short distance south of the western Guatemala points where Salvin found this gull to be fairly common in winter.

Thalasseus maximus maximus (Boddaert). ROYAL TERN.

Sterna maxima Boddaert, Tabl. Pl. Enl., p. 58, no. 988, 1783—Cayenne.

Specimens and records.—Puerto del Triunfo, 1 (January 15, 1926). Also noted at La Unión (March 8, 1926); La Libertad (January 14, 1927).

Status.—Uncommon winter visitant and early spring migrant coastwise.

Remarks.—The above-listed specimen was taken from a flock of seven on a sand bar near the mouth of the lagoon channel where several others were seen the same day. On January 14, 1927, a few were seen at La Libertad, and at La Unión on March 8, 1926, a flock of about twenty was seen on a rocky beach at low tide. These last were still in pure winter plumage with no trace of the black, prenuptial, head feathers visible and probably were one-year-old, nonbreeding birds.

Thalasseus elegans (Gambel). ELEGANT TERN.

Sterna elegans Gambel, Proc. Acad. Nat. Sci. Phila., 4, p. 129 (1848) 1849—Mazatlán, Sinaloa, Mexico; Saunders, Cat. Birds Brit. Mus., 25, p. 84, 1896—La Unión; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 407, 1903—La Unión.

Thalasseus elegans Ridgway, Bull. U. S. Nat. Mus., 50, pt. 8, p. 472, 1919 (cit. of above); Coues, Ibis, p. 389, 1864—"San Salvador" (=La Unión).

Specimens and records.—No specimens. Recorded from La Unión (December 18, 1862); "San Salvador" [=La Unión].

Status.—Rare midwinter visitant coastwise.

Remarks.—The specimen upon which the above citations are based was collected, according to Saunders, on December 18, 1862, at La Unión, by Captain Dow. Dr. Coues, to whom Salvin sent the

skin for examination, pronounced it "identical with a typical *T. elegans* from California."

***Chlidonias nigra surinamensis* (Gmelin). BLACK TERN.**

Sterna surinamensis Gmelin, Syst. Nat., 1, pt. 2, p. 604, 1789—Surinam.

Specimens collected.—Lake Olomega, 1 (September 4, 1925).

Status.—Rare fall migrant to fresh-water lakes in the lowlands.

Remarks.—The bird taken is in pure juvenal plumage as were two others seen the same day. An adult observed at the same place on September 9 appeared to have just started the fall molt. These are the only records for El Salvador.

Family RYNCHOPIDAE. Skimmers

***Rynchops nigra nigra* Linnaeus. BLACK SKIMMER. PERRA.**

[*Rynchops*] *nigra* Linnaeus, Syst. Nat., ed. 10, 1, p. 138, 1758—coast of South Carolina.

Specimens collected.—Lake Olomega, 9 (August 19, 1925; February 3, 7, 15, 1926).

Status.—Common fall migrant and midwinter visitant on Lake Olomega.

Remarks.—The first black skimmer was taken on August 19, 1925, but no others were noted until August 26, when one was seen at dusk. They were common the night of August 27 and could be heard calling about the lake all night. These fall birds disappeared during the day, and search in all parts of the lake failed to disclose other than the one collected on August 19. We supposed at the time that they came from the ocean each night, but as no trace of them was found in January at Puerto del Triunfo, it may be that they were migrating and simply stopped to feed. From February 3 to 15, 1926, they were abundant at Lake Olomega and large flocks were seen daily. They had disappeared completely on the next visit to the lake, April 5.

Whatever the status of the birds discussed by Ridgway¹ and Griscom² from the west coasts of Mexico and Guatemala, there can be no doubt of the identity of the present specimens, which are unequivocally *nigra*. Possibly another form occasionally occurs coastwise, but if so no trace of it was found either on open beaches or on tidewater lagoons in January, 1926, or April, 1927.

¹ Bull. U. S. Nat. Mus., 50, pt. 8, p. 454, 1919—footnote.

² Ibis, p. 545, July, 1935.

Order COLUMBIFORMES. Pigeon-like Birds

Family COLUMBIDAE. Pigeons and Doves

Columba fasciata letonai Dickey and van Rossem. EL SALVADOR
BAND-TAILED PIGEON. PALOMA (all large doves).

Columba fasciata letonai Dickey and van Rossem, Proc. Biol. Soc. Wash., 39, p. 109, November 3, 1926—Mt. Cacaguatique, Dept. San Miguel, El Salvador; *ibid.*—Volcán de San Miguel.

Columba fasciata letonae [sic] Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 110, 1932—Salvador; Ibis, p. 553, July, 1935—Salvador (crit.).

Specimens collected.—1935—Mt. Cacaguatique, 5; Volcán de San Miguel, 1; Los Esesmiles, 3; Volcán de Santa Ana, 1.

Status.—Fairly common resident of the Arid Upper Tropical Zone both along the cordillera and in the coastal range. The association chiefly favored is the oak groves, and the vertical range is from 3,500 to 8,000 feet altitude.

Remarks.—Band-tailed pigeons throughout their range are partial to oak groves, and the local race is no exception to the rule. On Mt. Cacaguatique and Volcán de San Miguel they were confined almost entirely to the oaks, but on Los Esesmiles, although they showed decided partiality to the oak association, they were also found in the humid cloud forest. The single Volcán de Santa Ana specimen, the only one seen in that locality, was taken in the cloud forest at 6,500 feet altitude.

Nesting.—Birds which were paired, and which were either breeding or about to do so, were collected on various dates between November 25 and March 19.

Colors of soft parts.—Adults: bill, yellow with tip black; tarsi and feet, dull, waxy yellow; claws, black; eyering, dull red; eyelids, slate-gray; iris, dull pink.

Stomach contents.—All of the Mt. Cacaguatique and Volcán de San Miguel specimens had been feeding on acorns when shot. Flocks were sometimes seen feeding in the many species of berry-bearing trees shading the coffee groves at the edge of the oaks.

Columba flavirostris flavirostris Wagler. RED-BILLED PIGEON.

Columba flavirostris Wagler, Isis von Oken, 24, Heft 5, col. 519, 1831—Mexico; Salvadori, Cat. Birds Brit. Mus., 21, p. 285, 1893—part, Volcán de San Miguel; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 234, 1902—part, Volcán de San Miguel.

Columba flavirostris flavirostris van Rossem, Trans. San Diego Soc. Nat. Hist., 6, No. 8, p. 197, August 30, 1930—El Salvador (crit.); Miller, Condor, 34, p. 12, January, 1932—Sonsonate (nesting); A. O. U. Check-list, ed. 4, p. 152, 1931—Salvador.

Chloroenas flavirostris flavirostris Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 300, 1916—Volcán de San Miguel.

Specimens and records.—Lake Olomega, 4; Puerto del Triunfo, 1; Sonsonate, 1; Mt. Cacaguatique, 3; Lake Chanmico, 2; Volcán de Santa Ana, 1. Also noted at Rio Goascorán; Enquentros; Colima; San José del Sacare; Barra de Santiago; Lake Guija. Recorded from Volcán de San Miguel; Sonsonate.

Status.—Common resident of timbered regions everywhere below about 5,000 feet.

Remarks.—Red-billed pigeons prefer timbered areas in the vicinity of water and therefore are more common at lower levels than in the mountains. About Lake Olomega they were especially common, and usually many pairs were encountered in the course of a morning's hunt. They are typically birds of the treetops and except under unusual circumstances are not often found on the ground or in low undergrowth. Like many other woods dwellers they are far more often heard than seen. Above 3,500 feet on Mt. Cacaguatique this species and *Columba fasciata* occurred together in the oak groves.

Nesting.—The breeding season apparently extends throughout the year, for males in breeding condition were taken in January, April, May, July, September, November, and December, and females either laying or about to do so in July, September, and November. A nest which was found at Lake Olomega on April 11, 1926, was discovered by accident by Morales, who was crawling about under a dense thicket of coyol palms looking for eggs of *Nyctidromus*. It consisted of only a few twigs, barely sufficient in number to keep the egg from rolling about and was placed on top of two crossing fronds about six feet from the ground. The very sheltered location was the only circumstance which prevented the haphazard collection of twigs from falling to the ground with the first passing breeze. The male was on the nest and did not fly off until Morales was directly beneath the nest. The single egg, in which incubation had just commenced, is pure white. It measures 36.5×26.9 mm. and like most pigeons' eggs is equiended or nearly so. A nest found by Alden Miller at Sonsonate on July 14, 1925, also contained but one egg. This latter nest was placed some twelve feet above the ground in a line of trees dividing two areas of pasture land, and so haphazard

was its construction that a count of the twigs used totaled only forty-five.

Plumage notes.—From the series at hand it is not possible to gain any definite idea of the time of molting. Some specimens taken in April, July, November, and December are in perfect, newly acquired plumage; others in the same months are in worn plumage, while still others are in molt.

Colors of soft parts.—Adult: bill, flesh color, basal half (including cere), coral-red; eyering, tarsi, and feet, dark coral-red; claws, flesh color; iris, orange-red or reddish orange.

Stomach contents.—Mistletoe berries, 3. This species is a berry-eater, and none of the three specimens taken on Mt. Cacaguatique had been feeding on acorns. They often concentrate about especially favorable, berry-bearing trees and were noticed feeding on a great variety of such food. At Enquentros (near Divisadero) they came in a steady stream to a large pile of rock salt which had been thrown out near the old mine buildings. At least fifty individuals came to this pile in the four hours we were there. Each bird seemed to pick up as much as it could hold and remained for several minutes. Since the place where the rock salt was dumped was only a few yards from a broad, shallow stream where sand and fine gravel were available in abundance, there seems to be every reason to suppose that the salt was what these birds sought, and that they were not mistaking it for gravel.

***Zenaidura macroura carolinensis* (Linnaeus). EASTERN MOURNING DOVE.**

Columba carolinensis Linnaeus, Syst. Nat., ed. 12, 1, p. 286, 1766—South Carolina.

Specimens and records.—San Salvador, 1 (March 6, 1912); Colima, 2 (January 21, 1927) Rio Goascorán, 1 (October 27, 1925). Also noted at Los Esesmiles (February 12, 1927); San José del Sacare (March 12, 1927); Divisadero (April 5, 1926).

Status.—Generally rather uncommon, but at times locally abundant, migrant and winter visitant to suitable areas throughout the country between 100 and 6,500 feet. Noted between October 27 and April.

Remarks.—These four specimens are not to be distinguished from eastern United States examples of *carolinensis*. The differences between *carolinensis* and *Z. m. marginella*, while marked in series,

are only average, and the allocation of individual birds is correspondingly difficult, but in the present case there seems to be little doubt that *carolinensis* is the correct determination.

The first fall arrivals were seen at Rio Goascorán on October 27, 1925, when numbers were to be found about the cattle pastures and cornfields. They were abundant in the fields about Colima from January 21 to 27, 1927, where flocks of fifty or more were, at times, encountered. At Los Esesmiles on February 12, 1927, three were seen flying over the open rolling country at 6,500 feet, and on March 12, 1927, at San José del Sacare an equal number was noted in the pine barrens; a single bird was taken at San Salvador on March 6, 1912. For the late spring there is only the record of two birds which were seen near Divisadero on April 5, 1926.

There was no indication that mourning doves breed anywhere in El Salvador, and it seems most likely that their true status is that of migrants from the eastern United States.

Melopelia asiatica asiatica (Linnaeus). EASTERN WHITE-WINGED DOVE. PALOMA DE ALA BLANCA.

Columba asiatica Linnaeus, Syst. Nat., ed. 10, 1, p. 163, 1758—"in Indiis" (=Jamaica).

Melopelia asiatica asiatica Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 378, 1916—La Libertad; La Unión.

Melopelia leucoptera Salvadori, Cat. Birds Brit. Mus., 21, p. 392, 1893—part, La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 245, 1902—part, La Libertad.

Specimens and records.—San Salvador, 1; Lake Channmico, 1; San Sebastián, 1; Puerto del Triunfo, 1; Rio Goascorán, 1; Volcán de San Miguel, 4; Los Esesmiles, 3; Rio San Miguel, 1; Divisadero, 1. Also noted at San José del Sacare; Volcán de Santa Ana. Recorded from La Libertad; La Unión.

Status.—Common resident of the entire country practically everywhere below 7,500 feet altitude.

Remarks.—The fourteen specimens of this dove which were collected are all, in spite of a good deal of individual and seasonal variation, clearly referable to the more richly colored, smaller-billed, tropical race. Several small flocks of white-winged doves were seen flying over Divisadero at different times during October, 1925, under circumstances which suggested that they might be migrants, but they were all too high in the air to be taken. Local hunters asserted that this species arrives, in some years, in immense flocks during the

fall and winter months but, if this is so, such flocks failed to put in an appearance during the time of our field work in the country.

The usual habitat of this dove is open or semiopen woodland, although almost any type of country may be occupied in greater or lesser numbers.

Nesting.—Specimens in breeding condition were taken on various dates between January 3 and July 21. A nest which was found on Volcán de San Miguel on March 25, 1926, was placed on top of a vine-covered tangle of burned brush in a small lava gully at 3,500 feet altitude. The sitting parent flopped off the nest, and “broken-winged” down the gully, leaving the eggs plainly visible from a distance of several yards. The two eggs measure 30.5×22.0 mm. and 29.7×22.2 mm., respectively. In color they are white, strongly tinged with “pale pinkish buff.” Nests were noted in some low, scattered trees on the summit of Volcán de Santa Ana during various times in May, 1927. Some of these were certainly occupied at the time, for the sitting birds were flushed.

Plumage notes.—Adults just starting the annual molt were taken July 21, and others which were just completing it were taken in late October and early November. The most richly colored specimens are those in the freshest plumage and conversely those in worn plumage are the palest and grayest.

Colors of soft parts.—Adults: bill, black; orbital space, slaty blue; iris, orange-red to brownish orange; tarsi and feet, coral-red.

***Columbigallina passerina pallescens* (Baird). MEXICAN GROUND DOVE. TORTOLITA.**

Chamaepelia passerina ? var. *pallescens* Baird, Proc. Acad. Nat. Sci. Phila., p. 305 (1859) 1860—Cape San Lucas, Lower California.

Specimens collected.—Divisadero, 14 (September 23, 25, 28, October 2, 3, 4, 12, November 14, 1925); Rio Goascorán, 2 (October 26, 27, 1925); Colima, 1 (January 21, 1927); Lake Guija, 1 (May 24, 1927).

Status.—Common local resident along the lower foothills of the interior mountains, and on the coastal plain of the Rio Goascorán. The local range lies wholly within the Arid Lower Tropical Zone.

Remarks.—The series of eighteen birds proves, surprisingly enough, to be identical with a series of thirty *pallescens* from Sonora, Cape San Lucas, Arizona, and southeastern California. It is thus evident that a tongue of this widespread form extends much farther southward than has hitherto been suspected. The exact points of

contact with the darker-colored *Columbigallina passerina neglecta* remain to be determined. Todd in his revision of the genus¹ lists *pallescens* from Gualan and Lake Atitlan and *neglecta* from Dueñas and Toyabaj, Guatemala, an apparently impossible state of affairs since the last-named locality is well to the north of the other three. Considering the fact that El Salvador birds are unequivocally *pallescens*, it would seem certain that all birds from western Guatemala at least should be treated as *pallescens* also.

It is difficult to account for the total absence of this species from the greater part of El Salvador, and equally difficult to make rhyme or reason of its very peculiar distribution. If a straight line is drawn from the southern end of Lake Guija to the tip of the most northern arm of the Gulf of Fonseca, it will be seen that the four localities in which Mexican ground doves were found are located at spaced distances thereon and at gradually descending levels, from 1,450 feet at Lake Guija, 1,000 feet at Colima, 800 feet at Divisadero to 100 feet at Rio Goascorán. At some parts along this line, namely from Divisadero to Rio Goascorán, the distribution is continuous, for in passing between these places on mule-back on two different occasions, we found the species to be common everywhere. There seem to be no conditions at any of these places which are not duplicated in a score of others from which the species was totally absent. Proceeding northwestward into Guatemala along a continuation of this general line, it will be seen that the localities at which the species has been recorded continue on in an ascending scale to elevations of 5,000 feet or more.

Nesting.—There seems to be no definite nesting season, for specimens taken at all times of the year showed breeding activity. There is no cessation of breeding with the fall molt. A nest found at Divisadero on October 13, 1925, was composed of fine twigs and grass and placed in the horizontal crotch of a mimosa at a height of about fifteen feet. The female was on the nest, but no eggs had been laid. Several days later this nest was found to be partially loose from its site and was, of course, deserted.

Plumage notes.—The annual molt occurs (varying with different individuals) in September, October, or November. The male taken at Lake Guija on May 24, 1927, is undergoing what appears to be a complete body molt and has also renewed scattered primaries and rectrices. The few old feathers remaining indicate that the molt is the postjuvinal.

¹ Ann. Carnegie Mus., 8, pp. 507-603, 1913.

Colors of soft parts.—Adults: iris, rose-pink with a narrow, paler ring next to pupil; bill, dull red or dark pink basally, blackish terminally; tarsi and feet, flesh color; eyering, greenish white; eyelids, greenish gray.

Stomach contents.—The exclusive diet was tiny seeds, evidently from a great variety of plants. The stomachs always contained a quantity of fine gravel or sand.

Columbigallina rufipennis rufipennis (Bonaparte). RUDDY GROUND DOVE. TORTOLITA COLORADA.

Ch[amaepelia] rufipennis Bonaparte, Compt. Rend., **40**, p. 22, 1855—Cartagena, Colombia.

Chamaepelia rufipennis Salvadori, Cat. Birds Brit. Mus., **21**, p. 487, 1893—La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, **3**, p. 253, 1902—La Libertad.

Chamaepelia rufipennis rufipennis Ridgway, Bull. U. S. Nat. Mus., **50**, pt. 7, p. 424, 1916—La Libertad.

Columbigallina passerina pallescens Miller (not *Chamaepelia passerina* var. *pallescens* Baird), Condor, **34**, p. 12, January, 1932—Sonsonate; Lake Olomega (nesting).

Specimens and records.—Puerto del Triunfo, 3; Divisadero, 3; Lake Olomega, 7; Sonsonate, 1; Lake Guija, 1; Lake Channico, 8; San Salvador, 2; Miraflores, 1. Also noted at Volcán de San Salvador; Hacienda Zapotitán; San Sebastián; Rio Goascorán; Rio San Miguel; Colima; Volcán de Santa Ana; Barra de Santiago. Recorded from La Libertad; Sonsonate; Lake Olomega.

Status.—Common resident everywhere in the Arid Lower Tropical Zone. Although found in practically every association from the swamp jungle to open plains, the species is most abundant in the lower foothills. Its occurrence at 4,500 feet on the volcanoes of Santa Ana and San Salvador is almost certainly a comparatively recent range extension.

Remarks.—Ruddy ground doves were extremely common in all open or semiwooded lowland localities, and the species is, with the possible exception of the Inca dove, the most numerous member of the Columbidae to be found in El Salvador. It is by no means confined to the open or gallery forest, for even in the coyol-palm undergrowth in the coastal swamp forests and throughout the foothill districts it is not at all rare. In company with *Scardafella inca* these ground doves have accepted the protection of villages and farms and often resort to orange and other trees in dooryards and patios.

This species is the only resident dove, with the occasional exception of *Melopelia asiatica*, which gathers into flocks at any season. Normally it goes in pairs and breeds practically, if not entirely, throughout the year. However, in the fall at the time of the annual molt there is a short-lived flocking tendency, when as many as fifty may be found together. *C. rufipennis* is semiarboreal and when not actually feeding spends much of its time in trees. Twenty-five to fifty feet were by no means uncommon heights at which to find it.

Nesting.—Eggs were noted in the months of April, May, July, August, and September, and it is probable that most of the sets are laid during that time. However, birds in full breeding condition were taken in November, January, and February. Therefore, there is every probability that eggs might be found with a little searching in any month of the year. So far as observed, all nests were placed in shrubbery or on the smaller branches of low trees at from six to ten or even fifteen feet from the ground. A favored site was on crossing fronds of the coyol palm, where the maze of spines gives protection from most predatory animals. Other spiny or thorny trees, such as orange or lime, are also much used. The nests are better concealed as a rule than those of the Inca dove, and frequently are sheltered by a drooping spray of foliage.

Plumage notes.—The annual molt normally takes place in August, September, and October, but as late as January (19th), individual birds which are still molting may be found. There is a very extensive body molt during the month of May, which in younger birds includes part or all of the rectrices also. There is a pronounced average seasonal variation in the males, for in the spring the plumage is decidedly paler than when newly acquired in the fall. Worn specimens also average brighter red than fresh ones, but when skins of similar season and wear are compared there is little individual variation.

***Columbigallina minuta interrupta* (Griscom). GUATEMALA
GROUND DOVE.**

Chamaepelia minuta interrupta Griscom, Amer. Mus. Novit., 379, p. 4, October 17, 1929—Secanquim, Guatemala.

Specimens collected.—Hacienda Zapotitán, 1 (June 28, 1912).

Status.—Rare and local summer visitant to the Arid Lower Tropical Zone.

Remarks.—The single specimen taken was a female of the year which was just completing the postjuvenile molt. It displays the characters ascribed to this race, "hair brown" (instead of "drab") coloration and conspicuously whiter throat, and thus not only extends the previously known limits of *interrupta* some distance to the south, but affords another instance of the west Guatemalan affinities of western El Salvador.

Several other individuals of this species were seen at Zapotitán at the time the single bird was collected. The only place where they were found was an open, grass-grown pasture, dotted with mimosa and mesquite thickets and intersected by several small streams. In June, 1927, Zapotitán was visited again for the express purpose of procuring more specimens of this dove. However, in the interval from 1912 to 1927 the ranch had been converted from a cattle range to cultivated farming land and the old pastures, if not plowed up, had grown into dense tangles through which it was impossible to hunt. In spite of a careful search of the vicinity not a single bird of this species was noted, and the conclusion is that they probably left the locality as soon as primitive conditions were disturbed.

***Claravis pretiosa pretiosa* (Ferrari-Peréz). BLUE GROUND DOVE.
TORTOLITA AZÚL.**

Peristera pretiosa Ferrari-Peréz, Proc. U. S. Nat. Mus., 9, p. 175, September 28, 1886—Jalapa, Vera Cruz, Mexico (substitute name for *Columba cinerea* Temminck, preoccupied).

Specimens and records.—Puerto del Triunfo, 1 (January 4, 1926); Rio San Miguel, 9 (February 1 to 21, 1926); Barra de Santiago, 1 (April 3, 1927); Lake Olomega, 2 (April 9, 10, 1926). Also noted at Hacienda Zapotitán (June 28, 1912).

Status.—Common from early January to late June in wooded and semiwooded regions below 1,500 feet. Apparently a spring and summer visitant only.

Remarks.—The first arrival was noted at Puerto del Triunfo on January 4, 1926, when a female was shot from the tip of a mangrove on the mud flats near the town. It is evident that females arrive somewhat in advance of the males. Although occasional females were noted throughout January, it was not until February 1 that the much more conspicuous males put in an appearance. From that date until April 10 (the last field day spent in suitable territory) males were common all through the Lake Olomega-Rio San Miguel area. On June 28, 1912, two males in what may have been passage

flight were seen at Zapotitán. In July of the same year the species was totally absent from San Sebastián, a most favorable locality for them, nor did we find any trace of them between July 25 and September 20, 1925, about Lake Olomega, where the species was very common from early February to the middle of April, 1926. Salvin and Godman regard this dove as migratory throughout Mexico and Central America, but give no dates except that of Richmond¹ who found it appearing on the Rio Escondido on the Atlantic coast of Nicaragua on September 20. The dates for some of the specimens listed by Salvadori in *Catalogue of the Birds of the British Museum* (vol. 21) still further indicate that there is a migration to the north coast in the fall months. Carriker evidently considers the species resident in Costa Rica.

The usual haunts of this beautiful ground dove are wooded areas, fairly free from underbrush, and dotted with occasional clearings. We found it to be an arboreal species and it was rarely encountered on the ground. In the early spring, when nesting had commenced, a dozen or more males could be heard hooting during the hottest hours of the day. The hoot is very different from the call-note of any other of the resident doves and consists of an often repeated single note. Its most pronounced characteristic is its explosive quality.

Males appear to outnumber the females, and during the nesting season two or more males are almost always in attendance on every female. It may be that the species is polyandrous.

Nesting.—A nest found at Rio San Miguel on February 10, 1926, was five feet from the ground in a small tree in a clearing in the forest. It was rather compactly built and was well concealed in a mass of twigs and foliage. The two pure white eggs, in which incubation was well started, were accidentally broken and no measurements were taken. The female (no male was near this nest) sat very close and, although several shots had been fired only a few feet from her, did not flush until, during the search for a fallen bird of another species, the nest was almost touched.

Plumage notes.—The prenuptial molt evidently takes place very early, for most of the birds are in perfect plumage at the time of arrival in January and February. One of the males retained a few brown feathers of the juvenal(?) plumage when shot on February 13. This specimen is noticeably darker, and the blue of the upperparts less pure than in fully adult males.

¹ Proc. U. S. Nat. Mus., 16, p. 523 (1893) 1894.

Colors of soft parts.—Adults: iris, rose-pink; orbital skin, pale, slaty gray; bill, pale, dull olive; tarsi and feet of male, reddish flesh-color, of female, paler; claws, black.

Scardafella inca (Lesson). INCA DOVE.

Chamaepelia inca Lesson, Compl. Oeuvres Buffon, 20, p. 211, 1847—"Mexico" (probably west coast).

Scardafella inca Salvadori, Cat. Birds Brit. Mus., 21, p. 465, 1893—La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 248, 1902—La Libertad; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 390, 1916—La Libertad; Miller, Condor, 34, p. 12, January, 1932—Sonsonate; Lake Olomega (nesting); Bent, Bull. U. S. Nat. Mus., 162, 1932—Salvador; (nesting).

Specimens and records.—Lake Olomega, 5; Divisadero, 4; Rio Goascorán, 1; Puerto del Triunfo, 1; Rio San Miguel, 1; San Salvador, 3; Sonsonate, 3; Mt. Cacaguatique, 1; Los Esesmiles, 1. Noted at every collecting station in El Salvador. Recorded from La Libertad; Sonsonate; Lake Olomega.

Status.—Common (locally abundant) resident of open or semi-wooded areas throughout the country. Most numerous in the cultivated and semicultivated foothill districts. Noted from sea level to 7,500 feet.

Remarks.—After careful comparison of twenty El Salvador skins with nearly twice that number from the vicinity of Tucson, Arizona and northern Sonora, we fail to find any constant characters by which *S. i. dialleucos* of Bangs can be distinguished, at least in so far as the applicability of that name to El Salvador specimens is concerned. It is true that the southern birds (particularly the females) average more heavily barred below, but on the other hand some of the El Salvador males are the least heavily barred and most strongly vinaceous of the entire series. So far as relative darkness of coloration of the upperparts and the amount of grayish white on the wings is concerned, there is no appreciable difference in the two lots. If anything the Tucson birds are the darker above. Specimens from the Atlantic slope may belong to a separate race, but we have seen no examples.

The Inca dove is generally distributed, and numerically is probably the commonest local dove. In some lowland districts it is outnumbered by *Columbigallina rufipennis*, but in most places above the first terrace of foothills the Incas are dominant. They are essentially birds of open fields, pastures, and dooryards and can be classed with the comparatively few species which have directly benefited

by, and have increased in numbers because of, agriculture. Not only has the former forest largely disappeared, thus providing a great increase in habitable territory with decrease of natural enemies, but food (Egyptian corn, milo maize, and many seed-bearing weeds of foreign importation) has become almost inexhaustible. Moreover, the immediate vicinity of houses is preferred for breeding places, as offering still further protection from natural enemies. Pairs or, at most, small flocks composed of two or three pairs, are the invariable rule throughout the year, and it is probable that many groups of four are simply parents and young. The nearest approach to flocking which was observed was at a water hole on the dry sandy peninsula of San Juan de Goso. Here, in January, came an almost uninterrupted stream of Inca doves, but although a dozen or more might be present at a time, they arrived by ones and twos and departed the same way.

Nesting.—Inca doves breed through the year, and there appears to be no notable increase or decline of mating activity correlated with season. The number of broods raised per year is not known to us, but because of the continued breeding it is not difficult to conjecture four or five. There is no cessation of nesting because of the fall molt. There are three females taken during July and August which were in the midst of the annual molt and yet were either laying or sitting upon fresh eggs. Males and females alike appear to have no dormant period whatsoever. This statement is based upon specimens taken every month in the year besides others inadvertently shot, but not preserved, and observations of numerous nests.

Eggs were seen in July, August, September, October, November, February, and April. Nests of the usual, slight, dove construction were seen in orange trees, balanced on palm fronds, in mimosa thickets, and even in hanging fern baskets around the corridor of an occupied ranch house. Some attempt at concealment was usually noticeable, but this was frequently offset by the unsecretive manner in which the parents left or approached the nest. Apparently two eggs are always laid.

Plumage notes.—The annual molt occurs, in different individuals, in July, August, September, and October. The postjuvinal molt takes place soon after the bird reaches full size. As juveniles were seen or shot nearly every month in the year, it is likely that some time elapses before the annual molt becomes synchronized with that of the adult population.

Colors of soft parts.—Adults: iris, pink, pale rose, or orange-red; eyering, pale green or greenish white; eyelids, gray green or greenish gray; tarsi and feet, flesh color; bill, black, basal half dusky olive. Full-grown juvenile; iris, pale pink; bill, light plumbeous, terminal third black. Otherwise like adults.

Stomach contents.—Food appears to be Egyptian corn whenever available, otherwise small seeds of many species. Stomachs always contained moderate quantities of coarse sand or fine gravel. The corn taken is usually fallen grain, knocked down by grackles or other species.

***Leptotila verreauxi bangsi* Dickey and van Rossem. EL SALVADOR
WHITE-FRONTED DOVE. PALOMA COMÚN.**

Leptotila fulviventrís bangsi Dickey and van Rossem, Proc. Biol. Soc. Wash., 39, p. 110, November 3, 1926—Volcán de San Miguel, Dept. San Miguel, El Salvador; *ibid.*—Mt. Cacaguatique; Lake Olomega; Volcán de Conchagua; Rio San Miguel; Puerto del Triunfo; Lake Channmico; San Salvador; Divisadero.

Leptotila verreauxi bangsi Miller, Condor, 34, p. 13, January, 1932—Sonsonate; Lake Olomega (nesting); Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 117, 1932—Salvador (crit.).

Leptotila brachyptera Salvadori (not of Salvadori, page 545!), Cat. Birds Brit. Mus., 21, p. 548, 1893—in text La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 257, 1902—part, La Libertad.

Leptotila fulviventrís brachyptera Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 453, 1916—La Libertad.

Specimens and records.—Lake Olomega, 4; Rio San Miguel, 3; Puerto del Triunfo, 1; Divisadero, 2; San Salvador, 1; Lake Channmico, 3; Volcán de Conchagua, 3; Mt. Cacaguatique, 3; Lake Guija, 3. Also noted from San Sebastián; Rio Goascorán; Colima; Barra de Santiago. Recorded from La Libertad and numerous localities.

Status.—Common resident of wooded and semiwooded areas everywhere in the Arid Lower Tropical Zone. Locally it extends into the oaks and pines of the Arid Upper Tropical Zone to as high as 4,000 feet.

Remarks.—Examination of the type of *Leptotila verreauxi nuttingi* Ridgway (No. 91130, U. S. Nat. Mus. collection) leads us to question the advisability of recognizing that form, for it is simply an intermediate between *L. v. verreauxi* of extreme southwestern Nicaragua, Costa Rica, etc., and *bangsi* of El Salvador and northern Nicaragua. The russet on the inner webs of the inner primaries of the type reaches (basally) nearly or quite to the shafts, and only on the outer four is

it confined to the outer edges of the webs—characters which thus place it with *verreauxi* and not with *bangsi*. In the latter race the russet on the inner webs of all the primaries is present only as a trace on the extreme outer edges.

The habitat preferred by these doves is thick jungle with undergrowth not too thick for walking. They are usually loath to take wing, and unless the danger is pressing will run and dodge about among the shrubbery at an astonishingly rapid rate. The very neutral dorsal coloration renders them almost invisible when light conditions are not of the best. Were it not for the white tips of the lateral tail feathers, which are more conspicuous in life than could be thought possible from examination of skins, they would be even more easily overlooked. One wonders what possible value can attach to so betraying a type of marking.

Nesting.—A nest found at Lake Olomega on July 28, 1925, was of the ordinary type of dove construction and was placed about four feet from the ground on the top of a fallen tangle of branches and vines. The two eggs were cream-colored and thus much like the eggs of *Melopelia asiatica*, not white as in most pigeons. Another nest found at San Sebastián on July 15, 1912, was in a willow tree standing in several feet of brackish water. None of these eggs are now available for measurement.

It is clear that laying may occur at almost any time of year. A female taken February 12 was laying, and males taken in July, August, November, and January were in full breeding condition. A juvenile taken May 16 had evidently been out of the nest for at least a week, and another taken March 1 is in the postjuvenile molt. The species customarily goes in pairs the year round, and breeding does not seem to be in the least interfered with by any of the molts.

Plumage notes.—The postjuvenile molt, which occurs soon after the young bird has left the nest, results in a body plumage which in general is identical with that of the adult. The only average difference noted is that there is a tendency for the flanks to be more buffy, and there is often a buffy tinge to the vinaceous of the neck and chest. The amount of iridescence on the hindneck is largely individual and is not dependent on age. Some young still partly clothed in juvenile feathers have as much (and as brilliant) iridescent coloring on the nape and hindneck as other birds which are known to be fully adult. It is doubtful whether sex plays a very important part in this character, although males may possibly average brighter than

females. The postjuvenile molt includes all of the remiges and rectrices, although the wing and tail molt is very slow and may not be completed until long after that of the body plumage.

The annual molt of the adults usually starts in July, although it may not be finished in some cases until late October. There is a very heavy spring body molt which includes some of the rectrices, usually the central pair at least.

Colors of soft parts.—Adults: iris, orange to pale orange; eyering, tarsi, and feet, coral-red to dark coral-red; bill, black; eyelids, grayish blue with an irregular coral-red spot at anterior and posterior corners of eye. Juveniles: similar, but iris straw color.

Stomach contents.—Seeds of many varieties, 3; berries, 1.

***Oreopeleia albifacies silvestris* Dickey and van Rossem.**
EL SALVADOR QUAIL-DOVE.

Oreopeleia albifacies silvestris Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 130, June 29, 1928—Volcán de Santa Ana, El Salvador; Griscom, Amer. Mus. Novit., 379, p. 5, October 17, 1929—in text, El Salvador (crit.).

Specimens collected.—Volcán de Santa Ana (May 6 to 19, 1927); Los Esesmiles, 1 (February 13, 1927).

Status.—Uncommon resident in the Humid Upper Tropical Zone on Volcán de Santa Ana and in the cordillera.

Remarks.—The only localities in which these quail-doves were found were at 8,000 feet in the cloud forest on Los Esesmiles and on two of the lower spurs or old cones of Volcán de Santa Ana at altitudes of 5,000 and 6,000 feet. In the former place the sole specimen noted was one which got into a large steel trap set on the ground near a trail and was subsequently torn up by some animal. One wing, some tail feathers, and a foot were saved. As these parts do not differ from corresponding parts of the specimens from Volcán de Santa Ana, it seems permissible to suppose the Los Esesmiles birds to be of the present race. Certain deep and very loud notes, which were heard at rare intervals in the cloud forest, were positively ascribed by Morales to this species.

On Volcán de Santa Ana the species was not uncommon between 5,000 and 6,000 feet in the cloud forest on Cerro del Aguila and Cerro de Los Naranjos, but none was found on the central cone. In these places the birds were, at all times, solitary, and on not even one occasion was a pair noticed. They were usually, when first seen,

walking rapidly about on the forest floor, following narrow cattle paths or other lines where walking was easiest. When flushed they sometimes alighted on low horizontal branches and sometimes on the ground at some distance ahead. The appearance in life is heavy and, although exceedingly good walkers, they fall behind *Leptotila* both in trimness and activity. Although both *Leptotila verreauxi* and the present species have light-colored throats and foreheads, it is only in the case of the latter that these parts are conspicuous in life. The white tail spots of *Leptotila* are the immediate markings which catch the eye, but the light forehead and throat are blending. In *Oreopeleia albifacies* many birds would be overlooked were it not for the bobbing, disruptively colored head of walking birds.

Nesting.—Possibly, like *Leptotila*, this species is a year-round breeder. On Cerro de Los Naranjos on May 7, 1927, a female and a nearly grown juvenile were flushed from a well-concealed nest in a tangle of vines hanging from a tree in a steep-walled ravine in the forest. The young bird and the female were on the nest together, and there can be no question but that the older bird was the parent. On skinning her it was evident that an egg would have been laid within a few hours at most; in fact she was probably on the nest for that purpose at the time she was shot. The egg, which was creamy buff, was broken and therefore not saved. This nest was about twenty feet from the ground and seemed to be supported only by looped and crossing vines. It was well concealed and was discovered only by accident.

Plumage notes.—All of the adults shot during the month of May were molting rather heavily, and from the fact that in some cases all of the remiges and rectrices are being renewed the supposition is that it was the annual molt. The wing and tail of the bird found on Los Esesmiles, although fully adult, show more wear than would be expected had the annual molt occurred in the fall. The limited number of specimens does not allow of positive conclusions.

Colors of soft parts.—Adults: tarsi, feet, eyering, and postocular spot, lake red; ocular region, blue-gray; iris, orange-red; bill, black; claws, reddish brown.

Order PSITTACIFORMES. Parrots, Paroquets, and Macaws

Family PSITTACIDAE. Parrots, Paroquets, and Macaws

Ara macao (Linnaeus). RED, BLUE, AND YELLOW MACAW. GUARA.

[*Psittacus*] *macao* Linnaeus, Syst. Nat., ed. 10, 1, p. 96, 1758—South America.

Ara macao Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 565, 1897—La Unión; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 128, 1916—La Unión.

Specimens and records.—Lake Olomega, 3 (September 3, 14, 1925). Also noted on the Colinas de Jucuarán throughout August and September. Recorded from La Unión (probably in March, 1863).

Status.—Fairly common and probably resident in the woods about Lake Olomega and on the Colinas de Jucuarán. Probably occurred formerly all along the coastal plain, but now completely extirpated except in the almost uninhabited southeast part of the republic.

Remarks.—As a result of constant persecution, dating from the first days of trading ships, these macaws are now reduced to a comparatively few pairs which are said to nest in the wild section of the coast south of the Colinas de Jucuarán. During August and September, 1925, pairs and, rarely, as many as four birds together were seen flying over the hills. At this time of year the jocote trees (*Spondias mombin*) were in fruit, providing food for many species of birds, the macaws included. Several times attempts were made to stalk macaws as they fed in these trees in the cañons back of the lake, but their alertness made all efforts unsuccessful. The two specimens taken were a mated pair which were found feeding in a jocote tree near the solitary ranch house on the south shore. Both were going through the annual molt at this date. Another, shot on September 14, was in such fearful plumage, because of molt, that it was made into a skeleton.

Colors of soft parts.—Adults: skin of face and chin, flesh color; iris with broad ring of olive-green next to pupil and pale yellow outwardly; mandible and lower base and tip of maxilla, black, rest of maxilla, bluish white; tarsi and feet, blackish horn-color.

***Aratinga holochlora strenua* (Ridgway). NICARAGUA GREEN PAROQUET. PERICÓN.**

Conurus holochlorus strenuus Ridgway, Proc. Biol. Soc. Wash., 28, p. 106, May 27, 1915—Ometepe, Nicaragua.

Aratinga holochlora strenua Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 158, 1916—Volcán de San Miguel; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 58, 1918—Salvador.

Aratinga strenua Bangs and Peters, Bull. Mus. Comp. Zool., 68, p. 388, October, 1928—Salvador (crit.).

Conurus holochlorus Salvin and Godman (not of Sclater), Biol. Centr.-Am., Aves, 2, p. 572, 1897—part, Volcán de San Miguel.

Specimens and records.—Lake Olomega, 4; Puerto del Triunfo, 1; Sonsonate, 2; Volcán de San Salvador, 5. Also noted at Divisadero; Volcán de San Miguel; Colima; Lake Guija; Rio Goascorán.

Status.—Common resident everywhere in the Arid Lower Tropical and penetrating locally to 4,500 feet in the upper zones.

Remarks.—Specimens from Volcán de San Salvador average shorter in wing and tail than do those from the lowlands, but have the large feet and bills of typical *strenua*. Several birds shot on Volcán de San Miguel (not preserved) appeared to be typical *strenua* just as are the lowland birds. It is not impossible that *Aratinga rubritorquis* is really a small, red-throated, highland race of *holochlora*, and the Volcán de San Salvador specimens are, therefore, intermediate toward that form. However, until adequate material for the working out of the relationships of these two supposed species has been collected it would seem better to consider them specifically distinct. Bangs and Peters¹ regard *holochlora* and *strenua* as distinct species because taken in the same locality in Oaxaca in September. Parrots, after the breeding season, are notorious wanderers, and we do not believe that the evidence warrants such treatment.

This paroquet habitually travels in small flocks seldom containing more than fifty members, but in these flocks it is noticeable that pairs stay close together in flight and, when one also considers the many single pairs which are present irrespective of season, it is probably safe to state that these birds remain mated throughout the year. It is one of the most vociferous of local parrots, and in flight each member of the flock seems to try to outscreech all the others.

Nesting.—The nesting season is probably in February and March, for pairs were seen at work excavating holes in termite nests at Puerto del Triunfo the last part of January. A variety of sites must be chosen for, besides the termite nests, birds were seen to enter or leave old woodpecker holes in dead stubs. On Volcán de San Miguel, where the species was abundant, the site of a former colony was found at about 4,000 feet. In a deep gully at this point was a small, perpendicular-walled amphitheater, in the soft pumice and ash walls of which approximately a hundred holes about three inches in diameter had been drilled. Most of these had been dug out to a size which would admit a man's arm, and it was said that in some years large numbers of young pericones were taken from this place. Steps had been dug out to allow getting at some of the lower

¹ Bull. Mus. Comp. Zool., 68, p. 388, October, 1928.

holes, and there was a notched log lying nearby which had been used for reaching others. In 1926, however, this colony, as well as a smaller one in another gully, was deserted and the only occupants of the two-foot-deep holes were a few pairs of rough-winged swallows. In the town of San Miguel is a partly built church, roofless and with many shallow holes where bricks have fallen or been pulled out of the walls and also still deeper holes intended to receive the ends of beams at some future date. In these holes lived a colony of pericones which were leaving or entering at all times of the day. In November, 1925, there were no eggs or young, and the holes were used simply for resting places or were perhaps being held for future nesting sites.

Plumage notes.—Adults (showing scattered red feathers about head and neck) which were undergoing complete molt, including wing and tail feathers, were taken May 31, June 2, July 15, 23, and August 27. It seems evident, therefore, that the summer molt, which comes after the breeding season, varies in time with different individuals. An adult male taken at Puerto del Triunfo is just finishing a wing, tail, and body molt on January 22. There is not at hand material to show whether the whole plumage is renewed twice yearly, or whether the January molt in this one specimen is exceptional. The postjuvinal molt is practically complete in a specimen taken August 14.

Colors of soft parts.—Adults: bill, very pale, brownish flesh-color (nearly ivory), tip, dusky; tarsi and feet, brownish flesh-color; ocular space, dusky, bluish flesh; iris, orange-red. Full-grown young: similar, except the iris, which is dark brown.

Stomach contents.—On Volcán de San Miguel in March, 1926, the chief food was the fruit of the waxberry (*Myrica mexicana*), which at that season was just ripening.

***Aratinga rubritorquis* (Sclater). RED-THROATED PAROQUET.**

Conurus rubritorquis Sclater, Proc. Zool. Soc. Lond., p. 539, pl. 56 (1886) April 1, 1887—"South America or West Indies"; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 573, 1897—Volcán de San Miguel.

Aratinga rubritorquis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 156, 1916—Volcán de San Miguel; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 58, 1918—Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 175, 1932—Salvador.

Specimens collected.—No specimens.

Remarks.—The basis for the inclusion of this species is the record

from the *Biologia* of specimens taken on Volcán de San Miguel by W. B. Richardson in March, 1891. The species was not personally met with in that locality in March, 1926, nor in any other part of the country.

***Aratinga canicularis canicularis* (Linnaeus). PETZ' PAROQUET.
PERICO.**

Psittacus canicularis Linnaeus, Syst. Nat., ed. 10, 1, p. "68" (=98), 1758—"America" (=Northwestern Costa Rica: Bangs and Peters, 1928).

Conurus canicularis Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 577, part, La Libertad.

Eupsittula canicularis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 168, 1916—part, La Libertad; La Unión.

Specimens and records.—Lake Olomega, 3; Divisadero, 2; Rio Goascorán, 1; Puerto del Triunfo, 1; Lake Chanmico, 1; Lake Ilopango, 5; San Salvador, 4; San Sebastián, 2. Also noted at Rio San Miguel; Volcán de San Salvador; Colima; Lake Guija. Recorded from La Unión; La Libertad.

Status.—Common resident throughout the Arid Lower Tropical Zone; wandering after the breeding season to much higher elevations, such as 4,500 feet on Volcán de San Salvador.

Remarks.—We follow Bangs and Peters¹ in considering *Eupsittula* a subgenus of *Aratinga*, and also in recognizing two forms of *canicularis*. In the latter case it is advisable to compare adults of the two races, for the young of *canicularis* have frontal bands which are often just as narrow as those of the adults of *Aratinga canicularis eburnirostrum* (Lesson) which ranges from Guerrero north along the Pacific slope of Mexico to Sinaloa. El Salvador birds are, as would be expected, typical of the southern race.

Petz' paroquet is the commonest local member of the family, and one would have no difficulty in locating a hundred or more any day he desired. The center of abundance is on the coastal plain, but the species is very numerous almost anywhere in the Arid Lower Tropical Zone. Small flocks of from three or four pairs up to a dozen or more are the rule except during the breeding season.

Notwithstanding the fact that *canicularis* is more persistently sought as a cage bird than is any other local parrot, it is still very common and apparently in no danger of becoming depleted in numbers. Its popularity as a pet is not surprising when one considers the brilliant coloring and its gentle disposition when tamed. This

¹ Bull. Mus. Comp. Zool., 68, p. 388, October, 1928.

is the species most often seen perched on the edges of baskets and carried about on the heads or shoulders of market women. The local price is about twenty-five cents gold, but, of course, if the purchaser is a foreigner the "sky is the limit."

Nesting.—Although natural cavities and deserted woodpecker holes are often utilized, the sites preferred most of all are termite nests in which the birds do their own excavating. In fact, one can readily come to the conclusion that *canicularis* adopts other sites only when the local supply of termite nests is exhausted. It was rare to find such a structure which had reached a size sufficient to accomodate a nest cavity which was not occupied during the breeding season. Height appeared to be of little moment, for nest holes were noted from as low as five feet above the ground to as high as fifty or sixty feet. The system of excavation was similar in the several which were chopped out. The openings were near the bottom and went perpendicularly up through the wood-hard outer shell. At about a foot from the entrance the burrows made a sharp turn inward and downward into the softer core, and a roomy chamber, six or eight inches in diameter, was then dug out. Only "live" nests, that is, those occupied by termites, were used. Large nests might be occupied by two or three pairs of birds, but usually there was only one pair to a nest. At Rio San Miguel in February, 1926, paroquets were hard at work digging out nest holes. Five termite nests, from which birds were flushed, were chopped out on the 20th and 21st of the month, but they all proved to be empty except for one nest which held a single fresh egg. However, juveniles on the wing were taken as early as March 18, showing that in some cases laying must take place about the middle of January. The single egg collected is glossy white and measures 22.7×19.6 mm.

Plumage notes.—The juvenal plumage is very similar to that of the adults save that the seventh primary is less attenuate and the orange band on the forehead is very much narrower. There appears to be but one molt a year. The postjuvenal molt and the annual molt of the adults commences in July and is usually complete by the middle of September or, in two specimens, even the middle of August. As in the case of *Brotogeris* the primary molt is very irregular, for it starts at the fourth or fifth and progresses both inward and outward at the same time. Thus the first and tenth are normally the last primaries to be replaced.

Colors of soft parts.—Adults: iris, ivory-white to pale yellow; circumorbital skin, orange-yellow; cere and bill, pale, yellowish

flesh-color; mandible, dusky horn-color laterally; tarsi, feet, and claws, dark brown, tinged more or less strongly with plumbeous. Juveniles: similar to adults, but mandible concolor with rest of bill; tarsi, feet, and claws, paler brown. The dark lateral patches on the mandible appear at the time of the postjuvenal molt.

Stomach contents.—Seeds of the two species of ceiba (*Ceiba aesculifolia* and *C. pentandra*), so common throughout the lowlands of El Salvador, seem to provide the major if not the entire food supply during the late summer and early fall months. In passing under these trees, one often becomes aware of the presence of a feeding flock, not only by the drifting white filaments which are attached to the seeds, but by the pattering, on the leaves below, of the seed husks themselves.

Brotogetis jugularis chrysopogon (Lesson). LESSON'S PAROQUET.
PERICO.

Psittacus (*Caica*) *chrysopogon* Lesson, Rev. Zool., 5, p. 135, May, 1842—San Carlos, "Centre Amérique" (=La Unión, El Salvador).

Brotogetis jugularis Ridgway (not of Muller), Bull. U. S. Nat. Mus., 50, pt. 7, p. 183, 1916—part, San Carlos (=La Unión); La Libertad; San Salvador; Acajutla.

Brotogetis jugularis Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 582, 1897—part, La Libertad.

Specimens and records.—Lake Olomega, 6; San Salvador, 5; San Sebastián, 1; Sonsonate, 3; Lake Guija, 2; Puerto del Triunfo, 2; Divisadero, 1. Also noted at Rio Goascorán; Colima; Volcán de San Salvador. Recorded from La Unión; La Libertad; Acajutla; San Salvador.

Status.—Common (locally wandering) resident of the Arid Lower Tropical Zone, but occurs after the breeding season at altitudes up to 4,500 feet. The center of abundance is on the coastal plain.

Remarks.—Birds from El Salvador average decidedly more yellowish (less bluish) green both above and below and have the wing coverts decidedly paler than Colombia and Panama specimens of *B. jugularis*. Material is lacking to show with certainty the area where *chrysopogon* merges with *jugularis*, but the approximate point apparently is northwestern Costa Rica. The few available Mexican and Guatemalan specimens (U. S. Nat. Mus.) appear to be *chrysopogon*, but larger series are necessary to show whether they are really the same. As the type locality of *Psittacus jugularis* Müller is nothing more definite than "America," we suggest Panama as an appropriate restriction.

These little paroquets are nearly as common as *Aratinga canicularis* and are to be found everywhere in either thickly or thinly wooded country. In common with that species the present one has no objection to human habitations, and even comes into parks in the larger towns.

Nesting.—At Puerto del Triunfo in January, 1926, pairs were seen widening and digging out natural cavities such as knot holes and shallow cracks in dead trees. At one stub, completely rotted out in the center and with one side open, about a dozen pairs were found working at nesting sites on the inside of the shell. Ordinarily only two or three pairs occupy the same site. Termite nests are also sometimes drilled out, but only a few birds were flushed from these. *Aratinga canicularis canicularis* and *Aratinga holochlora strenua* are the chief users of termite nests, and they probably pre-empt the most desirable ones, leaving the smaller *Brotogeris* to hunt other locations. Old woodpecker holes are also used when available, but the best of these are almost sure to be occupied by ferruginous pygmy owls. In February, 1926 two termite nests from which Lesson's paroquets were flushed were chopped open, but the nest cavities were still incomplete and contained no eggs. A female taken January 22 was laying.

Plumage notes.—There appears to be only one molt a year, which takes place after the breeding season. It commences in April and is seldom completed before the first of June. The body plumage is acquired rather quickly, but the primaries are very slowly and irregularly replaced, and an occasional quill is retained until the next molt. In very new primaries the color of the outer webs is "grass green" or "parrot green," but this changes eventually to nearly blue or "sorrento green." The same is true of the terminal portion of the central rectrices. Postjuveniles and adults appear to be identical in coloration.

Colors of soft parts.—Adults: iris, dark brown; cere and ocular space, bluish flesh; tarsi and feet, flesh color or brownish flesh; bill pale, brownish ivory.

Amazona albifrons nana Miller. LESSER WHITE-FRONTED
PARROT. COTORRO.

Amazona albifrons nana Miller, Bull. Amer. Mus. Nat. Hist., 21, p. 349, 1905—Calotmul, Yucatan.

Specimens collected.—Barra de Santiago, 18 (March 31 to April 11, 1927); Lake Guija, 1 (May 27, 1927).

Status.—Common, locally abundant, spring and summer visitant to the Arid Lower Tropical Zone in the extreme western part of the country.

Remarks.—The intermixture of red feathers on the throat is a feature of west-coast specimens of *nana* to which Ridgway¹ has already called attention. This character is present in the majority of adult El Salvador birds, but otherwise they seem to be typical of this race; at any rate a minute examination of three birds from Yucatan loaned by the American Museum of Natural History fails to disclose any further differences between them and the El Salvador series.

At Barra de Santiago in early April, 1927, a mangrove island in the main lagoon was the roosting place for several thousand white-fronted parrots. This clump of tall trees was about two acres in extent and separated from the mangrove-bordered shores by a hundred feet or more of tide channel. Each evening about sundown the first flocks began to arrive, and by dusk the air was filled by screeching lines and companies, the uproar from which could be heard a mile or more away. Long after dark the last stragglers continued to arrive, each batch releasing a new bedlam as they quarreled with the birds already settled over choice perches. At the first hint of daylight they left and headed straight inland in small bands of a dozen to fifty, to be seen no more till the following evening. A very few, not more than a couple of dozen birds, frequented the cocoanut grove and second-growth jungle near the village on the peninsula, but at night these, too, joined the roost in the mangroves. Where the great bulk of the birds went during the day we could never discover, but they probably spread out over the jungle a short distance inland.

The comparatively few parrots of this species which were found at Lake Guija in May, 1927, roosted at night in pairs and small flocks so they were evidently not members of the great roost at Barra de Santiago, which was about forty miles away in an air line. Small, green parrots which were noted at San José del Sacare in early March, 1927, may or may not have been of this species.

Nesting.—The presence of juveniles on the wing at Barra de Santiago in early April indicates midwinter nesting as in the case of *Amazona auropalliata*.

Plumage notes.—Adult males have, normally, red greater wing coverts and alula. Adult females have the alula and greater coverts

¹ Bull. U. S. Nat. Mus., 50, pt. 7, p. 257, footnote, 1916.

green, often immaculate, but sometimes more or less mixed with red, particularly on the proximal coverts. Presumably the occasional appearance of red in the wings of the females indicates, in those individuals, a relatively old age. Postjuvenile males are essentially like adult males, but usually have a certain amount of green mixed with the red. Postjuvenile females are normally solid green on the feathers mentioned. Both sexes at this age tend to have the forehead creamy white rather than pure white.

Juvenile males have red greater coverts, but the red is usually more or less impure and mottled with green, dusky, or yellow. The alula is green, like the coverts and alula of the juvenile females. In the juvenile plumage of both sexes the forehead is yellowish, sometimes nearly lemon yellow, and the red of the face is confined to the loreal region. At all ages the frontal band of males averages decidedly broader than in females. The annual molt takes place in April and May.

Colors of soft parts.—Adults: bill, dull, light yellow with terminal half dull, bone-white; cere, legs, and feet, putty color; circumorbital space, mouse-gray; iris, pale yellow.

Amazona auropalliata (Lesson). YELLOW-NAPED PARROT. LORA.

*Psittacus (amazona) auro-palliatu*s Lesson, Rev. Zool., 5, p. 185, 1842—"Realejo-(centre Amérique)" [=Realejo, Nicaragua].

Amazona auropallata Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 231, 1916—San Salvador; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 82, 1918—Salvador.

Chrysotis auropallata Salvadori, Cat. Birds Brit. Mus., 20, p. 291, 1891—San Salvador; Salvin and Godman, Biol. Centr.-Am., Aves, 2, 586, 1897—Salvador.

Specimens and records.—Lake Olomega, 6; Puerto del Triunfo, 2; San Sebastián, 1. Also noted at Lake Channmico; Rio Goascorán; Colima; Barra de Santiago; Lake Guija; Hacienda Zapotitán. Recorded from "San Salvador."

Status.—Common resident of the Arid Lower Tropical Zone below 1,500 feet, with the center of abundance on the coastal plain. The "San Salvador" record doubtless pertains to the republic rather than to the capital city.

Remarks.—Pairs, or small flocks composed of pairs, are the rule with this parrot, and there is every indication that they remain mated throughout the year, if not for life. In the woods of the lower country, particularly around Lake Olomega and Puerto del Triunfo, it

was not unusual to encounter a dozen pairs or small flocks in a morning's hunt. Ordinarily they were not at all shy and, if no sudden noises or movements were made, one could often walk up under the trees in which they were feeding. Anyone knowing parrots only as caged birds has no idea how perfectly the green plumage blends with forest foliage, particularly if the natural contours of the birds are broken by a few intervening leaves. If suspicious they often remain perfectly still until the fancied danger is past, and they are then almost impossible to distinguish from their surroundings. When feeding or resting they are not as a rule very noisy. On the wing they "talk" and screech continuously.

Large numbers of yellow-naped parrots are captured when young and kept locally as cage birds, and many are also exported for the same purpose, most of them being shipped from La Unión. They are excellent talkers and can be seen about most of the native huts but, lacking the affectionate disposition of the smaller paroquets, they are usually wing-clipped and allowed the liberty of a small tree in the dooryard instead of being carried about on the shoulders of their owners. Either because Spanish is more easily learned than English or because the vocabulary used by native owners is more limited, not to say more lurid, these parrots seem to acquire locally a distinctness of enunciation rarely obtained in colder climates. Practically all exported birds are young and therefore "uneducated," but occasionally a tourist acquires an old bird. The pride in his (or her) new pet's extensive Spanish vocabulary would in most instances be considerably lessened if the utterances were even vaguely understood.

Nesting.—Natural cavities in large trees enlarged by the birds themselves when necessary, were the only nesting sites observed. Apparently this species does not make use of termite nests as do the paroquets. At Puerto del Triunfo a pair of birds worked industriously for several days at a cavity in a live tree (pl. XVII) in a grassy pasture near the town, carrying out small chips and pieces of rotten wood. The female, taken on January 7, was ready to lay. In February two pairs occupied holes in a tall, dead tree near Lake Olomega, but the nests were not accessible. When anyone approached this tree, the parents usually walked about on the great branches near the nest holes, with feathers on end and uttering growls like those of a small snarling dog.

Plumage notes.—The annual molt takes place in July and August and is practically complete by the end of the latter month. Birds

of the year apparently do not acquire any yellow nape feathers at the time of the postjuvenile molt, for this area is coming in entirely green on a molting female of the year, taken August 5. During the early winter or even as late as April of the following year, the young birds acquire a few scattered, yellow nape feathers, and in this latter month these younger birds also have a very extensive molt which includes even some of the primaries and tail feathers. In adults there is also an extensive body molt in April, just after the breeding season, but there is nothing to show that the wing and tail feathers are renewed more than once a year. We have no specimens to show whether or not the fully yellow nape is attained the second year. Apparently there is no breeding before the adult stage is reached, for only those birds with fully yellow napes showed sexual activity.

Colors of soft parts.—Adults and full-grown young of the year alike: iris, orange; orbital skin, grayish flesh or bluish flesh; bill, black terminally, bluish horn-color basally; tarsi and feet, horn color or plumbeous horn-color.

Order CUCULIFORMES. Cuckoo-like Birds

Family CUCULIDAE. Cuckoos, Road-runners, and Anis

***Coccyzus minor continentalis* van Rossem. BUFF-THROATED MANGROVE CUCKOO.**

Coccyzus minor continentalis van Rossem, Bull. Mus. Comp. Zool., 77, No. 7, p. 389, Dec., 1934—Volcán de Santa Ana, Dept. Sonsonate, El Salvador.

Specimens collected.—Rio Goascorán, 1 (October 28, 1925); Rio San Miguel, 1 (February 18, 1926); Volcán de Santa Ana, 1 (May 16, 1927).

Status.—Uncertain, but from present evidence the subspecies is a rare, though generally distributed, inland resident.

Remarks.—This cuckoo is apparently rather rare in El Salvador, for it was noted on but three occasions. The specimen from Volcán de Santa Ana was a female nearly ready to lay, for the largest ova had attained a diameter of three millimeters. She was accompanied by another bird, probably her mate, when shot in the cloud forest at an altitude of 4,500 feet.

Colors of soft parts.—Iris, brown; maxilla, black; mandible, dull orange-yellow with tip and tomia black; eyering, dull yellow; tarsi and feet, greenish horn-color.

Coccyzus minor palloris Ridgway. PACIFIC MANGROVE CUCKOO.

Coccyzus minor palloris Ridgway, Proc. Biol. Soc. Wash., 28, p. 105, May 27, 1915—Pigres, western Costa Rica; Bull. U. S. Nat. Mus., 50, pt. 7, p. 23, 1916—La Libertad.

Coccyzus minor Salvin and Godman (not *Cuculus minor* Gmelin), Biol. Centr.-Am., Aves, 2, p. 523, 1896—part, La Libertad (possibly *continentalis*, skin not examined).

Specimens collected.—Puerto del Triunfo, 1 (January 16, 1926); Barra de Santiago, 2 (April 9, 11, 1927).

Status.—Uncertain. Evidently this subspecies is a rather uncommon resident of the mangrove association along the coast.

Remarks.—El Salvador specimens of this race are not distinguishable from typical *palloris*. The occurrence of two very distinct races of *Coccyzus minor* affords another striking example of the composite nature of the avifauna of the republic for, while *palloris* is of Pacific distribution throughout its entire range, *continentalis* is clearly an intrusion from the Atlantic slope. The entry of *continentalis* into El Salvador is analogous to, and probably contemporaneous with, that of *Aimophila rufescens rufescens*, *Habia rubica salvadorensis*, *Icterus gularis gularis*, *Thamnophilus doliatus intermedius*, *Crypturornis cinnamomeus goldmani*, and others.

While the name "mangrove cuckoo" is inapplicable, locally speaking, to the interior race, *continentalis*, it is most appropriate for *palloris*, which, like the mangrove warbler and ochraceous vireo, seems to be confined strictly to the mangrove association, seldom or never straying even a short distance inland.

Colors of soft parts.—Iris, dark brown; bill, black with basal two-thirds of mandible dull orange; tarsi and feet, plumbeous horn-color.

Coccyzus americanus americanus (Linnaeus). YELLOW-BILLED CUCKOO.

Cuculus americanus Linnaeus, Syst. Nat., ed. 10, 1, p. 111, 1758—South Carolina.

Specimens collected.—Lake Olomega, 1 (August 31, 1925).

Status.—Rare fall migrant in the lowlands.

Remarks.—This specimen, a male of the year, was taken in the swamp forest near the lake. The measurements are as follows: wing, 136 mm.; tail, 131. If this specimen were not typical of *americanus* in color, it is so small that it would have to be referred to *C. a. julieni*. The shortness of the tail is not because of immaturity, for on one side the adult rectrices have been acquired.

Coccyzus americanus occidentalis Ridgway. CALIFORNIA CUCKOO.

Coccyzus americanus occidentalis Ridgway, Man. North Amer. Birds, p. 273, 1887—Santa Rita Mountains, Arizona.

Specimens collected.—Lake Olomega, 1 (September 11, 1925).

Status.—Rare fall migrant in the lowlands.

Remarks.—The measurements of the single specimen, an adult female, are: wing, 148.5 mm.; tail, 151.5. This bird appears to be typical of the western North American race.

Piaya cayana stirtoni van Rossem. PACIFIC SQUIRREL-CUCKOO. PÁJARO LEÓN.

Piaya cayana stirtoni van Rossem, Trans. San Diego Soc. Nat. Hist., 6, No. 12, September 30, p. 209, 1930—Mt. Cacaguatique, El Salvador; Griscom, Bull. Mus. Comp. Zool., 70, no. 9, p. 218, January, 1932—in text, Salvador.

Piaya cayana Salvin and Godman (not *Cuculus cayanus* Linnaeus), Biol. Centr.-Am., Aves, 2, p. 528, 1896—part, La Libertad.

Piaya cayana mehleri Stone (not *Piaya mehleri* Bonaparte), Proc. Acad. Nat. Sci. Phila., 60, p. 499, 1908—part, Salvador.

Piaya cayana thermophila Ridgway (not *Piaya thermophila* Sclater), Bull. U. S. Nat. Mus., 50, pt. 7, p. 47, 1916—part, La Libertad.

Specimens and records.—Lake Olomega, 4; Rio Goascorán, 1; Puerto del Triunfo, 1; Divisadero, 1; Volcán de Conchagua, 1; Mt. Cacaguatique, 1; San Salvador, 4; Lake Ilopango, 1; Sonsonate, 2. Also noted at Lake Channmico; Volcán de San Salvador; Rio San Miguel; Volcán de San Miguel; Colima; Hacienda Chilata; Hacienda Zapotitán; Barra de Santiago; Lake Guija. Recorded from La Libertad.

Status.—Common resident throughout the Arid Lower Tropical Zone and straggling occasionally to 4,500 feet in the Arid Upper Tropical Zone.

Remarks.—The squirrel-cuckoo is a not uncommon straggler into the oaks and pines of the Arid Upper Tropical, although typically it is an inhabitant of the "tierra caliente." Above an altitude of 2,500 feet there is a rapid diminution in numbers, and above 4,000 feet only an occasional bird is to be noted. On the volcano of San Salvador a few individuals were seen in June, 1912, as high as 4,500 feet at the edge of the cloud forest but, as elsewhere mentioned, the original flora of this mountain has undergone such changes in recent years that conditions are abnormal, and several lowland species have,

in consequence, worked their way to altitudes above those at which they occur under more primitive conditions. Salvin and Godman state that this species is to be found up to altitudes of 6,000 feet, but this must be due to peculiar local conditions.

Squirrel-cuckoos, although very common in suitable locations, are among the most solitary of birds and even during the breeding season are only rarely to be seen in pairs. While, like most members of this family, they are somewhat secretive they are, at the same time, curious and will come slipping silently through the trees to investigate anything which has aroused their suspicions. In their passage through the forest they run swiftly along the branches and among the foliage so that one at times has to take a second look to be sure whether the running animal is really cuckoo or squirrel. Strangely enough this resemblance is not reflected in the local name, which throughout the country is "Pájaro León" or "Lion Bird," because of the popular belief in an affinity between these cuckoos and pumas. In justification for such a belief it may be observed that cuckoos are sufficiently common to make the presence of one in the immediate vicinity of a puma almost a certainty. This name is also universally applied to an owl (*Ciccaba virgata centralis*).

The calls of this species are various. The most common one is a series of perhaps seven or eight slowly delivered and evenly spaced, loud, ringing notes delivered with exactly the same tone and volume throughout the series. It is the call most likely to be heard during the hottest hours of the day, when the woods are quiet except for the strident drone of numberless cicadas, or the monotonous piping of a ferruginous pygmy owl.

Nesting.—A female in the Miller collection, taken on July 19, 1925, at Sonsonate, was laying at the date of collection.

Plumage notes.—The juvenal rectrices and remiges are carried through the first year and are not shed ordinarily until the second fall, at the time of the first annual molt. The juvenal rectrices are narrower and more pointed at the tips, and the central pair have the terminal spots and the subterminal black areas only barely indicated. Otherwise the adults and birds of the year appear to be identical after the latter have completed the postjuvenal molt. For that matter there is very little difference between adult and juvenal plumages; the young are only more lax and fluffy with the throat a little grayer and less vinaceous. There is a limited spring body molt which takes place in February and March and is more extensive in birds of the previous year than in adults. At this time

also the young sometimes renew some of the juvenal rectrices. The annual molt occurs in July, August, and September and seems to vary a good deal in the time of its inception.

Colors of soft parts.—Adults: iris, dark crimson; bill and eyelids, apple-green; tarsi and feet, plumbeous blue; claws, black. Juveniles: similar, but iris reddish brown.

Stomach contents.—Caterpillars, 1; grasshoppers, 1; wasps, 1; miscellaneous insects, 1.

***Tapera naevia excellens* (Sclater). NORTHERN STRIPED CUCKOO.
TRES PESOS PIDE.**

Diplopterus excellens Sclater, Proc. Zool. Soc. Lond., p. 229 (1857) January 12, 1858—San Andrés Tuxtla, Vera Cruz, Mexico.

Tapera naevia excellens Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 67, 1916—Volcán de San Miguel.

Diplopterus naevius Salvin and Godman (not *Cuculus naevius* Linnaeus), Biol. Centr.-Am., Aves, 2, p. 540, 1896—Volcán de San Miguel.

Specimens and records.—Lake Olomega, 9; Divisadero, 2; Puerto del Triunfo, 1; Volcán de San Miguel, 1; Hacienda Chilata, 1. Also noted at Rio San Miguel. Recorded from Volcán de San Miguel.

Status.—Fairly common resident of the Arid Lower Tropical Zone and also occurs casually as high as 4,000 feet in the oaks of the Arid Upper Tropical. The species is most numerous on the coastal plain and adjacent foothills and was found to extend into the interior only as far as Divisadero and Volcán de San Miguel.

Remarks.—Although no definite type locality is given in the original description, Sclater states specifically that Boucard's "last collection," which contained the type of *excellens*, was from San Andrés Tuxtla in the State of Vera Cruz. That place, therefore, is the type locality.

The El Salvador race apparently is typical *excellens*. The five adult males have the following measurements: wing, 117–120 mm., tail, 170–180; culmen from base, 22.8–24.8; tarsus, 33.7–35.0. Costa Rican specimens are smaller, particularly in bill, and are more richly colored. If not intermediate toward *T. n. naevia* of northern South America, they may represent an unnamed form.

Striped cuckoos are arboreal members of the family and, even though often encountered in low scrub, none was ever seen on the ground. The characteristic call-notes are most often delivered from the top of a tall tree projecting somewhat above the surrounding

woods and, by using caution, it is not difficult to obtain specimens by listening for whistling birds. The full call is of five notes, but sometimes only the first two, three, or four are given. If a person attempts to whistle the Spanish words "Trés pésos pide" with emphasis on the accented syllables, the result will be a very close imitation of the striped cuckoo's call-notes. Even when the birds are calling they are very shy and difficult to approach, and if they once get the idea that they are noticed will fly off above the tree-tops and may not resume calling for some time.

Plumage notes.—Unlike those of *Piaya* the wing and tail feathers of maturity are attained at the postjuvenal molt, and the young are then to be distinguished from adults only by dissection. There is a spring molt in April, probably in the nature of a prenuptial, at which time one or two of the outer pairs of rectrices may be renewed along with scattered portions of the body plumage. The annual molt of the adults takes place from mid-August to the latter part of September. The plumage of this species is particularly subject to fading. Fresh fall specimens are strongly ochraceous, those taken in spring decidedly less so, and by midsummer this color has almost wholly disappeared from the pectoral region and flanks, leaving them dirty, grayish white.

Nesting.—Pure plumaged juveniles were taken from August 1 to September 29, and juveniles which were molting into the first fall plumage between August 14 and January 3. Since the postjuvenal molt commences almost before the young reach full growth, it seems probable that the January 3 specimen must have been hatched very late in the fall. In South America this cuckoo, the only American member of the family known to be habitually parasitic in its nesting, most frequently victimizes the genus *Synallaxis*.

Colors of soft parts.—Adults: iris, yellowish gray; maxilla, pale brown, base and ridge of culmen, darker; mandible, yellowish flesh-color; tarsi and feet, greenish blue. Juveniles: similar, but bill paler throughout; iris, dark, grayish brown; tarsi and feet, pale olive.

Stomach contents.—Large insects, 3; grasshoppers, 2; grasshoppers and beetles, 1; grasshoppers and caterpillars, 1.

***Dromococcyx phasianellus rufigularis* Lawrence. NORTHERN PHEASANT CUCKOO. TRES PESOS PIDE.**

Dromococcyx rufigularis Lawrence, Proc. Acad. Nat. Sci. Phila., p. 223, 1867—Guatemala.

Dromococcyx phasianellus ruficularis van Rossem, Bull. Mus. Comp. Zool., 77, p. 391, in text, 1934. •

Dromococcyx phasianellus Salvin and Godman (not *Macropus phasianellus* Spix), Biol. Centr.-Am., Aves, 2, 542, 1896.—Volcán de San Miguel; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 87, 1916—Volcán de San Miguel.

Specimens and records.—Lake Olomega, 3 (August 14, 24, 1925; April 12, 1926); Rio San Miguel, 3 (February 6, 21, 1926); Mt. Cacaguatique, 2 (November 28, December 1, 1925). Recorded from Volcán de San Miguel (March, 1891).

Status.—Probably a fairly common, though rarely seen, resident of the Arid Lower Tropical Zone, straggling locally to as high as 4,000 feet in the Arid Upper Tropical.

Remarks.—Notwithstanding certain resemblances between *Tapera* and *Dromococcyx*, such as the great development of the upper tail coverts and the similarity in call-notes, examination of skeletons shows that the two have, in reality, very little in common. *Tapera*, curiously enough, seems structurally to be very much closer to *Piaya* than to *Dromococcyx*.

Although usually to be found in rather close-growing undergrowth, either on the ground or perched very close to it, the pheasant cuckoo may occasionally be met in treetops of medium height. One of the Lake Olomega specimens was shot from the crown of a tall tree at least fifty feet from the ground, but this was a very unusual circumstance. As typical of the usual habitat as well as an example of the erratic behavior of these birds, we may cite the following extract from van Rossem's notebook which deals with the taking of the two Mt. Cacaguatique specimens. "On November 28, one was shot as it was running away from me under the coffee bushes only a few yards from some dense, tangled underbrush, through which ran a small stream. On December 1, I saw the second bird running parallel to me through the coffee and higher up the hill. In its haste the bird either fell down or stumbled twice and altogether the dash was a wild performance of flopping wings, tail, and legs. It finally entered some dense, second growth oak scrub but, when I fired, it again flew out into the coffee and sat with its back toward me, perfectly indifferent to my presence and not fifteen yards away." When surprised in the treetops two of the birds at Lake Olomega showed, for cuckoos, remarkably strong, fast flight. The breast muscles and sternum are proportionally very much larger than are those of any of the other resident members of the family.

The call-notes are so very similar to those of *Tapera* that only by listening closely can one detect the difference. The first three syllables, the "Trés-pésos," are precisely like those of *Tapera* but, instead of the final "píde," *Domococcyx* gives a short trill. Possibly one reason why pheasant cuckoos are so rare in collections is that the notes are not ordinarily distinguished from those of the much more common striped cuckoo.

Plumage notes.—The postjuvenile body plumage is not distinguishable from that of adults. The postjuvenile wing molt is decidedly out of the ordinary in that the fifth, seventh, eighth, ninth, and tenth juvenal primaries and the six outer secondaries are retained. Both of the postjuvenals, taken December 1 and April 12, respectively, show this condition. There was a limited spring molt of the body plumage taking place in the subadult bird taken on April 12.

Colors of soft parts.—Adults: iris, orange-brown; maxilla, blackish brown; mandible, light bluish toward tip, fading to flesh color at base; tarsi and feet, brownish flesh-color; eyelids, greenish yellow. Juveniles: similar, but iris dark gray or grayish brown; tarsi and feet with a decided plumbeous tinge; eyelids, dusky green.

***Morococcyx erythropygus erythropygus* (Lesson). LESSON'S
GROUND CUCKOO. SIGUA MONTE, PÁJARO BOBO.**

Coccyzus erythropyga Lesson, Rev. Zool., 5, July, p. 210, 1842—"San Carlos, Centre Amérique" (=La Unión, El Salvador).

Geococcyx erythropygius Schlegel, Mus. Pays-Bas, 1, no. 25, p. 42, 1864—San Carlos.

Morococcyx erythropygus Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 538, 1896—part, Salvador.

Morococcyx erythropygus erythropygus Ridgway, Bull. U. S. Nat. Mus., 50, pt. 7, p. 71, 1916—"San Carlos, Centre Amérique."

Piaya erythropygia Des Murs, Icon. Orn., livr. 11, pl. 66 and tab. of contents, 1848—San Carlos.

!Psaris tityroides Lesson (not of July, 1842!), Echo du Monde Savant, col. 253, August 11, 1842—San Carlos.

Specimens and records.—Lake Olomega, 4; Divisadero, 13; Volcán de Conchagua, 3; Sonsonate, 2; Barra de Santiago, 1; Volcán de San Salvador, 1; Lake Guija, 1. Also noted at Rio Goascorán; Hacienda Zapotitán; Volcán de San Miguel; Colima. Recorded from La Unión.

Status.—Common resident of brushy or sparsely wooded areas throughout the Arid Lower Tropical Zone and found in lesser

numbers at higher elevations. The extreme of altitude attained is 4,500 feet.

Remarks.—The single specimen from Lake Guija shows no approach toward the characters ascribed by Griscom¹ to the long-tailed race *M. e. macrourus* of the Rio Motagua Valley in south-central Guatemala.

These small ground cuckoos—road-runners in miniature—have probably extended their former range considerably since the destruction of the original forest, and are now numerous about the weeds and hedgerows of cleared fields, patches of wild pineapple, and cultivated fields of agave. They are exceedingly tame and on one's approach may remain perfectly motionless until nearly stepped on, when, suddenly coming to life, they walk about in a seemingly stupid and erratic manner just out of arm's reach. If startled suddenly they will make a short flight to the shelter of the nearest bushes and soon after (curiosity getting the better of them) will be seen creeping nearer through the bushes or stubble. The carriage is very much like that of a road-runner, that is, in running the body is thrown forward with the tail straight out behind. Ordinarily the posture is more upright, with the tail cocked up at an acute angle to the back. The only call-notes they were heard to utter were a series of very liquid and varied babblings.

The vernacular name now in common usage, "Rufous-rumped Cuckoo," is so obviously a misnomer (based probably on a distorted skin) that there is no point in continuing to use it.

Plumage notes.—The juvenal tail feathers are retained in their entirety until the following spring (March and April) when they are replaced by others not distinguishable from those of adults. There is tremendous variation in the amount of black present on the rectrices of both old and young, but this seems to be largely individual and not dependent on age. The amount, however, averages decidedly greater and is more uniform in males than in females. In adults of the latter it varies on the lateral pair from a trace about 1 mm. wide to about 15 mm. There is a limited, spring, body molt both in old birds and young of the previous year. The annual molt of the adults takes place (varying individually) between the end of July to the middle of October. It is noticeable that the underparts of the females average paler than the males.

¹ Amer. Mus. Novit., 414, p. 2, March 24, 1930.

Colors of soft parts.—Adults: iris, dark brown; tarsi and feet, light, reddish brown; maxilla, blackish brown, tomia narrowly orange at base and broadly orange terminally; mandible and edge of gape, orange; loreal space and eyering, yellow, varying from lemon-yellow to greenish yellow; superciliary and postocular regions, bright blue; subocular region, dark blue.

Stomach contents.—Twelve stomachs, in some of which small grasshoppers were present, show that the diet of the ground cuckoo is entirely insectivorous.

***Geococcyx velox affinis* Hartlaub. GUATEMALA ROAD-RUNNER.**
CABALLERO.

Geococcyx affinis Hartlaub, Rev. Zool., 7, p. 215, 1844—Guatemala.

Geococcyx velox affinis Moore, Trans. San Diego Soc. Nat. Hist., 7, no. 39, p. 462, May 31, 1934—Salvador (crit.).

Geococcyx velox Miller (not *Cuculus velox* Wagner), Condor, 34, p. 13, January, 1932—Lake Olomega (nesting).

Specimens and records.—Volcán de Conchagua, 2; Volcán de San Miguel, 1; Colinas de Jucuarán, 4; Los Esesmiles, 3. Also noted on Volcán de San Salvador; Volcán de Santa Ana; Mt. Cacaguatique. Recorded from "Lake Olomega" [i.e. Colinas de Jucuarán].

Status.—Common resident of open grasslands, pastures, and cultivated ground of the Arid Upper Tropical Zone. The extremes of altitude are 1,200 and 7,900 feet.

Remarks.—The habits of this southern representative of the genus differ little or not at all from those of the northern species. It prefers semiopen ground which is broken with rocks and which supports a sparse growth of grass and shrubs. On the Colinas de Jucuarán road-runners ranged over the grasslands of the summit and were also found nesting in the scrubby, scattered trees as low as 1,200 feet, at a point where the jungle of the lower levels met the open grassland of the hilltops. On Volcán de Conchagua and Volcán de San Miguel they were found exclusively above timber line—on the open slopes or in the brush-grown gullies between. The summit of Volcán de Santa Ana offers a very favorable habitat, for the ground is fairly level and even the crater itself is overgrown with patches of thorny scrub. On both Volcán de Santa Ana and Volcán de San Salvador road-runners now occur on the lower slopes, for in many places the original forest, utterly unsuited to their requirements, has given way to open fields of hennequin or corn.

Nesting.—On the Colinas de Jucuarán a nest containing a single egg was found on August 3, 1925. Four days later it held two eggs. The bird on this nest was the male and, although we waited for over an hour, the female was never seen. The male was in full molt when shot on August 7. On August 12, 1925, another nest which contained two partially incubated eggs was found about a mile distant from the first. At this latter nest only the female was present, and dissection showed the set to be complete. In both cases the parent sat very close and allowed an examination from a distance of only a few feet. The two nests, which were similar in situation and structure, were placed about six feet from the ground in small, spreading, thinly leafed trees (*Brysonima crassifolia*) known locally as "nance." They were in plain view from all directions except from directly overhead where they were protected by higher foliage. The material was heavy grass stems and fine twigs and, over all, the diameter was about one foot. The cup was large, about six inches in diameter, and rather deep. The female, like the male at the first nest, was molting heavily. A female that was taken on March 16, 1926, on Volcán de San Miguel was laying, although molting heavily at the time.

Plumage notes.—The annual molt takes place from early August to the middle of September. In February and March there is a partial body molt, at which time a variable number of tail feathers, and sometimes some of the remiges, are also replaced. The renewal of the tail is neither symmetrical nor in sequence, an irregularity which appears to be common to most of the American *Cuculidae*. It is not possible to determine whether this tail renewal includes all ages or whether it is confined to the young of the previous year as in *Moroeoccyx*, for the juvenal and adult tail feathers are so exceedingly similar that individual variation nearly covers the only difference which was observed, namely that of the narrower average width of those belonging to the young. A curious parallel to *Dromococcyx* is seen in the retention of the sixth juvenal primary until the following spring at least.

Colors of soft parts.—Adults: iris, dark brown, silvery white next to pupil; tarsi, feet, and mandible, plumbeous; maxilla, brown, darker on ridge of culmen; with bare skin on each side of the nape (concealed), scarlet; eyelids and postocular region, bright blue to pale, lavender-blue.

Stomach contents.—Grasshoppers, 4.

Crotophaga sulcirostris sulcirostris Swainson. GROOVE-BILLED ANI. CHIMUYO.

Crotophaga sulcirostris Swainson, Philos. Mag., n.s., 1, p. 440, 1827—Temascaltepec, Mexico; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 545, 1896—La Libertad.

[*Crotophaga*] *sulcirostris* Forbes and Robinson, Bull. Liverp. Mus., 1, no. 2, p. 46, 1898—Acajutla.

Crotophaga sulcirostris sulcirostris Miller, Condor, 34, p. 14, January, 1932—Sonsonate; Lake Olomega (nesting).

Specimens and records.—Lake Olomega, 4; Puerto del Triunfo, 1; Rio San Miguel, 1; Barra de Santiago, 1; Sonsonate, 3; Divisadero, 3; Volcán de San Miguel, 1; Mt. Cacaguatique, 1; San Salvador, 4. Also noted at Volcán de San Salvador, Volcán de Santa Ana, and at every collecting station in the Arid Lower Tropical Zone. Recorded from La Libertad; Acajutla; Sonsonate; Lake Olomega.

Status.—Abundant resident throughout the Arid Lower Tropical Zone and reaching, locally, an altitude of 4,500 feet.

Remarks.—The term "cowbird" could much more appropriately be applied to the groove-billed ani than to the icterine bird which now carries it, for between anis and cattle there is the closest sort of association with mutual benefit to both parties. As the cattle graze along, there are sometimes as many as a dozen anis with each animal, keeping close to the head and hoofs. From repeated observations it is certain that many insects are aroused by the animals' movements, and the less active of these are caught by anis. When following the feeding cattle the short legs of these birds are a great handicap, and in order to keep up they scramble frantically along, sometimes finding it necessary to use their wings to carry them through or over difficult places. If an animal stops or lies down to rest, the anis perform a great service in picking the ticks from whatever portions of the body are accessible. They were even seen leaping from the ground beneath a grazing cow, snatching at ticks on her belly and udder.

Anis are extremely sociable, one might almost say affectionate, in all their habits. Not only do they invariably travel in flocks, but there apparently exists the utmost amity between individuals. They feed side by side with never a sign of friction or argument over the choicer insects, and at night roost in low trees or bushes, pressed shoulder to shoulder to the limit of available space. We not infrequently found them thus when hunting at night. During the time just preceding nesting it was noticeable that they were inclined

to roost two and two instead of in a long line. In some cases the pair was sitting in close contact, even though there might be plenty of room to perch comfortably.

The ordinary or "conversational" notes are a series of very liquid and what can best be described as "contented" bubblings and cluckings. The louder, often repeated "chee-múy-o-chee-múy-o" is the alarm note.

It is evident that cool weather is not tolerated, for anis are pre-eminently birds of the hot lowlands and seldom straggle into the higher levels. They are abundant all along the line of the railroad running from La Unión to San Salvador and thence to Acajutla, for the railroad naturally follows the most open country and, in addition, is usually deeply ditched on each side of the roadbed. These ditches are more or less boggy in the rainy season, and along the edges insects are correspondingly abundant.

Nesting.—In late July, 1925, several nests were found in the mimosa scrub in the marsh along the north shore of Lake Olomega. On July 29 one of these held ten apparently fresh eggs, another held one fresh egg, and a third two old (rotten) eggs, evidently relics from an earlier nesting. These nests were all in similar situations, that is, they were rather conspicuously placed in mimosa bushes and more than six feet above the mud or water. They were large, bulky affairs of thorny twigs and were lined with strips of bark and broad, thin, green leaves. There was evidence that most or all of this lining was deposited after laying commenced. On August 1 these nests were again investigated. The one which had held ten eggs was now empty, and the second nest which had contained one egg on July 29 now held three. The latter nest was simply an unlined cup of dead mimosa twigs when first found, but by the time three eggs had been laid it was well lined with fresh green leaves. The curious thing about this group of nests—there was no real colony, for nests were scattered at well-spaced intervals everywhere—was that eggs invariably disappeared as soon as seven or eight had been laid. The maximum number noticed in any nest was a "set" of thirteen found on July 29. However, we saw nothing which would lead to the suspicion that more than one female was laying in a nest. Although eggs were still being laid on August 15 and a pair was seen carrying nesting material into the densely foliated top of a thirty-foot tree on August 4, the taking of a young bird just commencing the postjuvenile molt on December 14 indicates a nesting considerably later than the middle of August.

Plumage notes.—The postjuvenile plumage, attained by a complete body and tail and a partial wing molt, is not different from that of the adults except that the rectrices are noticeably narrower. An irregular molt of the primaries takes place at this time, although some of the juvenal quills (though their number and location varies) are held over till the following spring. In March and April of the next year there is a partial body, tail, and wing molt in which an irregular number of rectrices are renewed and such juvenal remiges as have been held over from the previous fall are replaced by new ones. The adult plumage with wide rectrices follows in the second fall, that is, at the first annual molt. The time of the annual molt extends from the middle of July to the first of October, the younger (one-year-old) birds molting earlier than the older ones. The spring molt of the adults includes some of the rectrices and secondaries.

Colors of soft parts.—Adults and young: iris, dark brown; bare skin of face, dull black; bill, tarsi, and feet, shiny black. The bill usually shows patches of horn color, because of frequent scaling.

Stomach contents.—Insects of many species, including small scarab beetles and small grasshoppers. A great number of ticks are undoubtedly taken from cattle (see *antea*).

Order STRIGIFORMES. Owls

Family TYTONIDAE. Barn Owls

Tyto alba guatemalae (Ridgway). CENTRAL AMERICAN BARN OWL. TECOLOTE.

Strix flammea var. *guatemalae* Ridgway, Bull. Essex Inst., 5, p. 200, December, 1873—Chinandega, Nicaragua; Ridgway, in Baird, Brewer, and Ridgway, Hist. No. Am. Birds, 3, p. 14, 1874—in text, San Salvador (crit.).

Tyto perlata guatemalae Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 610, 1914—San Salvador (note on type loc.).

Aluco sp.? van Rossem, Condor, 16, p. 13, 1914—San Salvador.

Strix perlata Salvin and Godman (not of Lichtenstein), Biol. Centr.-Am., Aves, 3, p. 2, 1897—part, Salvador.

Tyto alba guatemalae van Rossem, Trans. San Diego Soc. Nat. Hist., 6, p. 250, 1931—El Salvador (crit.).

Specimens and records.—Divisadero, 7; Rio Goascorán, 2; Puerto del Triunfo, 1; Colima, 1. Also noted from San Salvador; Lake Chanmico; Lake Olomega; San Miguel. Recorded from San Salvador.

Status.—Common resident of Arid Lower Tropical Zone in central and eastern departments from sea level to at least 2,300 feet.

Remarks.—It is perhaps significant that barn owls were not found in the western departments between about 89° West and the Guatemala boundary. As Ridgway¹ has already commented, the name *guatemalae* is in all probability a misnomer, for the race has not definitely been found to occur west of San Salvador and Lake Chamnico.

The eleven specimens taken are all clearly referable to the dark, southern form and bear out minutely the characters ascribed to it by Ridgway. However, there is some evidence that *guatemalae* may be only a dark phase of the common North American barn owl, for a Sonora specimen in the Dickey collection is apparently identical with El Salvador birds. The four females are, both collectively and individually, darker throughout than the males. This difference also was noticeable in several cases where the male of a pair was taken and the darker mate escaped.

Although the species is fairly common in the lowlands of the Oriente and also about the city of San Salvador where church towers provide roosts and nesting places, the center of the barn owl population in El Salvador is the maze of old mine tunnels and workings at Divisadero. It is safe to say that more were seen at that place than at all other localities combined. The preferred workings here were steeply inclined or vertical shafts, from which drifts extended horizontally at various levels. By taking stands at the surface levels it was an easy matter to collect the desired specimens as they emerged at dusk. An additional reason why Divisadero is a favored locality is that the surrounding region has been almost entirely denuded of woods and is now, to a great extent, open pastures, farm lands, and abandoned fields where small rodents are relatively numerous. Barn owls were also common in the open fields in the valley of the Lempa at Colima. One which was taken there was shot at night while in close company with a flock of *Burhinus bistriatus vigilans*. At Rio Goascorán at least two pairs inhabited extensive cultivated fields and cliffs overlooking the river. There was nothing in their habits to distinguish these southern birds from the barn owl of North America.

Nesting.—A nest containing six eggs was found at Divisadero on October 19, 1925. The site was in a little side pocket of a nearly vertical, long-abandoned mine shaft, the entrance of which was practically hidden by small trees and shrubbery. The nest was about ten feet from the top and close to another cavity which had

¹Bull. U. S. Nat. Mus., 50, pt. 6, p. 510, footnote, 1914.

evidently been used by barn owls for several seasons prior to the occupancy of the newer site. Both birds were at the nest. The male flew out and was shot, but the much darker-colored female escaped by diving down the shaft, which was of unknown depth. Another nest was found on October 29, 1925, in the cliffs along the Rio Goascorán, but the site could not be reached due to overhanging rocks. The female, when shot on the above date, had but recently completed laying, for the ovary was still enlarged.

Stomach contents.—In choice of food the southern race seems to duplicate its northern relative, and hence is one of the most valuable of all birds from the viewpoint of the agriculturist. The two nest cavities at Divisadero were literally carpeted with pellets in which were represented several of the smaller rodents of the region. Genera which were positively identified were *Sigmodon* and *Rattus*.

Family STRIGIDAE. Typical Owls

Otus trichopsis mesamericanus van Rossem. CENTRAL AMERICAN SPOTTED SCREECH OWL.

Otus trichopsis mesamericanus van Rossem, Trans. San Diego Soc. Nat. Hist., 7, p. 184, 1932—Los Esesmiles, Dept. Chalatenango, El Salvador.

Specimens collected.—Mt. Cacagatique, 1 (December 16, 1925); Los Esesmiles, 2 (March 2, 1927); San José del Sacare, 1 (March 16, 1927).

Status.—Apparently fairly common resident of the oak-pine association of the Arid Upper Tropical Zone along the cordillera. The extremes of altitude at which the species was encountered (3,500 to 8,000 feet) indicate that it occurs throughout this zone.

Remarks.—Spotted screech owls were encountered but three times. On each of these occasions they were stumbled upon entirely by accident, and it is therefore not unreasonable to suppose that the species is fairly common throughout the oak and pine belt. The first specimen was taken on Mt. Cacagatique, where it was noticed perched in thick undergrowth beneath some second-growth oaks. Although awake and ready to fly at an instant's notice, it allowed an approach to within arm's length. Other screech owls heard calling at this station were provisionally referred to this species. The second time the species was noticed was on Los Esesmiles, where one was seen snuggled against a lodged mass of dead pine needles near the top of a small, twenty-foot pine. At the shot two owls fell, and investigation showed that the female had been sitting in a hollowed-out

depression on top of the needles. Dissection showed that she had already laid one egg, evidently only a few hours before, and would have laid another within a day at most. Oddly enough no suitable nesting stub was within several hundred yards. The specimen taken at San José del Sacare flew out of a thicket of young pines and oaks, when shot fired at another bird tore the foliage close beside the owl. It is evident from the above that *Otus trichopsis* is not easily aroused from its daytime roosting place and that the taking of specimens is very much a matter of pure luck.

Colors of soft parts.—Adults: iris, bright yellow; bill, pale, bluish green; cere, pale olive; toes and claws, brownish flesh-color, the latter blackish terminally.

Stomach contents.—Insect remains, 1; insect remains, mouse hair and green blades of grass, 1.

Otus choliba cooperi (Ridgway). COOPER'S SCREECH OWL.

Scops cooperi Ridgway, Proc. U. S. Nat. Mus., 1, p. 116, 1878, Santa Ana, Costa Rica; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 19, 1897—Volcán de San Miguel.

Otus cooperi Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 710, 1914 (cit. of above); Cory, Field Mus. Nat. Hist., Zool. Ser., 13, p. 31, 1918, "Salvador"; van Rossem, Condor, 29, p. 26, January, 1927—Salvador.

Specimens and records.—Lake Olomega, 1; El Carmen, 1; Rio San Miguel, 3; Volcán de Conchagua, 1; Divisadero, 1. Also noted at Volcán de Santa Ana (?). Recorded from Volcán de San Miguel.

Status.—Fairly common resident of the Arid Lower Tropical Zone. The species is apparently most numerous in the semimarshy, wooded area about Lake Olomega. Detected certainly from 200 to 3,300 feet altitude.

Remarks.—Five of the six adult specimens represent the light tawny phase, the type of coloration described by Ridgway.¹ The sixth, which is in the gray phase, is identical with two specimens from Chomes, Guanacaste, Costa Rica. These three, compared with the commoner light tawny phase, are very much paler and more ashy and have the white markings on the scapulars decidedly more conspicuous. There appear to be no significant mensural differences between Costa Rican and Salvadorean specimens.

It is not likely that this owl is any more common than the spotted screech owl, which it replaces in the lowlands, but it is much more wary and is easily frightened into flight in the daytime. A Cooper's

¹ Bull. U. S. Nat. Mus., 50, pt. 6, p. 710, 1914.

screech owl is almost sure to be flushed, if one passes within ten or fifteen yards of its roosting place, whereas, as noted under that species, the spotted screech owls are prone to sit tight until almost brushed against. The first specimen of *cooperi* to be collected was taken at Lake Olomega on August 18, 1925. It was found perched in plain view on a horizontal branch of a large tree in the forest near the lake. Because of work in localities apparently not favorable to the species, it was not encountered again until February, 1926, when it was found to be fairly common in the woods along the Rio San Miguel and at El Carmen. Two of the four birds taken at these localities were flushed from their roosting places in trees during the day. In each case they proved extremely difficult to collect, for they flew off through the woods or even over the treetops for a hundred yards or more, and had to be followed up and refushed one or more times. The other two were taken at night with the aid of a jack-light, as was the specimen taken on Volcán de Conchagua. Although the eyes of this species do not shine, the birds usually come readily to "squeaking" and thus may be decoyed at night and shot with but little trouble. A screech owl heard at 4,500 feet on Volcán de Santa Ana was, on the basis of call-note alone, provisionally referred to the present species. It was certainly not *trichopsis*.

Nesting.—The four males taken between February 9 and 15 were in breeding condition and probably had mates with eggs at no great distance from the places where they were found. In each case a thorough canvass was made of nearby cavities, but without result. On April 10, 1926, a native brought in a nearly grown, young bird which he had stoned from a family party of four young and two adults which were sitting in a row on a horizontal branch over a road near Divisadero. These data show *cooperi* to nest in the spring like the northern species. It does not reverse seasons like the barn owl, which breeds in the spring in the north and in the fall in Central America.

Colors of soft parts.—Adults: iris, bright yellow or orange-yellow; toes and bases of claws, cere, and bill, olive, the bill paler terminally; claws, blackish terminally.

Stomach contents.—Insect remains, 2; grasshoppers, 1.

***Bubo virginianus melancerus* (Oberholser). CENTRAL AMERICAN GREAT HORNED OWL. BUJO.**

Asio magellanicus melancerus Oberholser, Proc. U. S. Nat. Mus., 27, p. 180, 1904—Tehuantepec City, Mexico.

Bubo virginianus van Rossem (not *Strix virginiana* Gmelin), Condor, 29, p. 26, January, 1927—Salvador.

Specimens and records.—Mount Cacaguatique, 1 (December 8, 1925). Also noted at Rio Goascorán October 30, 1925. Recorded from "Salvador."

Status.—Detected only as a rare fall and winter visitor to the Arid Lower Tropical Zone. Altitudes at which the species was found were 100 and 3,500 feet.

Remarks.—The single specimen collected is identified by Dr. Oberholser as this form. It is not different in color from the average of *Bubo virginianus pacificus* except that the tarsi and toes are immaculate buff instead of mottled with dusky. The size of the bird, an adult male, is: wing, 340 mm., tail, 195; tarsus, 59; middle toe minus claw, 47.5; bill from cere, 30.8. These measurements are no smaller than those of many male *pacificus* and, were it not for the intervening and very differently colored *pallascens*, there would be little excuse for recognizing *melancerus* as different from *pacificus*. Ludlow Griscom¹ has lately suggested that *melancerus* is synonymous with *Bubo virginianus mayensis* Nelson.

This one bird, the only horned owl seen in El Salvador, was shot at night from a dead stub in a cornfield at 3,500 feet altitude. No call-notes were heard in the locality at any time, and the species is probably rare. At Rio Goascorán at about dusk of the evening of October 30, 1925, a horned owl was heard hooting for several minutes from a rocky butte near the river, but search the following day failed to produce any further evidence of its presence. Possibly the hooter was only a transient through the locality.

Rhinoptynx clamator clamator (Vieillot). STRIPED HORNED OWL.

Bubo clamator Vieillot, Ois. Am. 1, 52, pl. 20, Sept. 1857—Cayenne (Hellmayr, 1906).

Specimen collected.—Sonsonate, 1 (July 17, 1925).

Status.—Of rare occurrence in the foothills of the Arid Lower Tropical Zone.

Remarks.—Dr. L. H. Miller collected the only specimen of this owl known for El Salvador. It was taken at the agricultural experiment station near Sonsonate and, thanks to Dr. Miller's generosity, is now No. 22,571 of the Dickey collection.

¹ Ibis, 5, pp. 546-7, July, 1935.

Colors of soft parts.—Iris, "chrome"; claws (in dried skin), black; bill (in dried skin), blackish plumbeous.

Lophotrix cristata stricklandi Sclater and Salvin. STRICKLAND'S OWL.

Lophotrix stricklandi Sclater and Salvin, Ibis, 1, p. 221, 1859—Vera Paz, Guatemala.

Specimen collected.—Mt. Cacaguatique, 1 (December 13, 1925).

Status.—Uncertain, but probably a rather rare resident of the highlands.

Remarks.—The single specimen discovered was found in the upper branches of a grove of slender second-growth oaks at 3,500 feet. It was plainly visible from the distance of a hundred feet, and attention was first drawn to it by the very prominent, white facial markings. These owls, in life, are much more conspicuous than is evident in the prepared skins. This specimen is of the paler phase usually found on the Pacific slope of Central America. The stomach contained remains of large insects, mostly beetles.

Colors of soft parts.—Iris, reddish brown; cere, grayish olive; feet, pale flesh color; claws, black terminally, horn color at base; bill, black with ridge of culmen and tip and mandible from angle of gonys to tip, flesh color.

Glaucidium brasilianum ridgwayi Sharpe. FERRUGINOUS PYGMY OWL.

Glaucidium ridgwayi Sharpe, Ibis, 5, p. 55, in text p. 58, January, 1875—Mexico.

Glaucidium brasilianum ridgwayi Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 798, 1914—San Salvador; Lake Ilopango (crit.); van Rossem, Condor, 29, p. 26, January, 1927—Salvador.

Glaucidium ferrugineum Ridgway (not *Strix ferruginea* Maximilian) Ibis, (3), 6, p. 15, 1876—part, "San Salvador."

Specimens and records.—Lake Olomega, 1; Rio San Miguel, 4; Volcán de San Miguel, 3; San Salvador, 8; Lake Ilopango, 1; Mt. Cacaguatique, 2; Sonsonate, 2; Lake Guija, 1. Also noted at Puerto del Triunfo; Colima. Recorded from San Salvador; Lake Ilopango.

Status.—Common resident of wooded areas throughout the Arid Lower Tropical Zone and locally in the lower fringes of the Arid Upper Tropical. The vertical range is from sea level to 4,000 feet.

Remarks.—The twenty-two skins obtained fall naturally into three phases or types which correspond very closely with the three

"groups" described by Ridgway. These three phases may be characterized briefly as follows:

1. Tail bands white or nearly so, at any rate strongly contrasted with the darker bands; upperparts grayish cinnamon brown; crown streaks conspicuously white. Nine specimens.

2. Tail bands variously intermediate between 1 and 3; upperparts pale snuff brown; crown streaks strongly tinged with ochraceous. Seven specimens.

3. Tail bands ferruginous hazel, scarcely contrasted with the darker bands; upperparts ferruginous hazel; crown streaks obsolete or nearly so. Six specimens.

These groups occur independently of age, sex, or season and, to a certain degree, of locality, although Ridgway's tabulation of 304 specimens taken over the great expanse of territory between the southern United States¹ and Peru shows group 2 to be predominant in the north and 1 and 3 in the south. Group 1 more closely resembles the other species of *Glaucidium* in most of its characters and may represent the most primitive form.

Mated pairs which were collected present the following phase combinations: (a) ♂ of 1, ♀ of 3; (b) ♂ and ♀ of 3; (c) ♂ of 2, ♀ of 3.

This species of pygmy owl is most active in the dusk and early morning, but may also be found foraging during the day and on moonlight nights. On more than one occasion one was seen hunting at midday in the full glare of the sun and seemed to be not at all inconvenienced by the bright light.

The preferred habitat is light, open woodland of medium height, and in such an environment one or more ferruginous pygmy owls a day may be found with but slight effort. It is during the mating and nesting season that they are most easily detected, for then their hooting is practically continuous. The single, often repeated, monotonous note can be very easily imitated by whistling, and males usually come immediately to investigate the supposed trespasser on their preserves. Hooting is most often heard from early February until late in the summer, but by no means ceases during the winter months, for birds were heard on Mt. Cacaguate in November and December, and at Puerto del Triunfo and Colima in January. A persistent hooter can become very much of a nuisance if his stand

¹ The ferruginous pygmy owls of the southwestern United States and northwestern Mexico have been described, recently, as a distinct race (*G. b. cactorum*). See van Rossem, Proc. Biol. Soc. Wash., 50, p. 27, 1937—near Guaymas, Sonora, Mexico.

chances to be close to camp. On Volcán de San Miguel one male had a habit of performing, practically without cessation, from about four in the afternoon until late at night until we were finally forced, on this account, to make him into a specimen.

Nesting.—At San Salvador on March 16, 1912, a nest containing two, partially incubated eggs and the dried remains of a third was found in an old woodpecker hole in a dead stub about twenty feet from the ground. This set was collected with the incubating female. The male was not in evidence, either on this or subsequent dates. On March 23 a second female and two more eggs were taken from this same nest, and still a third set of two with the female on April 2. Another nest found at San Salvador on March 20, 1912, was in a rather large natural cavity in a live mango tree. It also held two eggs, a number which seems to constitute the normal set in this latitude. The females do not sit closely, and a stick thrown against the nest stub will invariably bring them out at once.

Colors of soft parts.—Adults: iris, bright yellow; bill and toes, pale, dull, greenish yellow; cere, yellowish olive; claws, black.

Stomach contents.—Always large insects such as beetles and grasshoppers. Although pygmy owls were not infrequently seen to pursue small birds and even such larger species as the groove-billed ani and rufous ground dove, no feathers were found in any stomachs or crops, and it is doubtful if more than an occasional bird is captured.

***Speotyto cunicularia hypugaea* (Bonaparte). WESTERN BURROW-ING OWL.**

Strix hypugaea Bonaparte, Amer. Orn., 1, p. 72, 1825—western United States.

Specimens collected.—Divisadero, 1 (March 13, 1926); Colima, 1 (January 24, 1927).

Status.—Possibly a rare resident, but detected only in midwinter and spring in open pastureland at Divisadero and Colima.

Remarks.—The two El Salvador specimens cannot be distinguished from birds taken in California and Arizona. In this race there is great individual variation, but extremes seem to be present wherever the subspecies occurs.

Both of the burrowing owls taken were shot at night. None was seen during the day, although a special watch was kept when in favorable localities, nor were any nest burrows found.

Burrowing owls have been recorded¹ from seacoast points in

¹ Biol. Centr.-Am., Aves, 3, p. 31, 1897.

western Guatemala, and they probably will be found along the coast of El Salvador as well as in the interior.

***Strix fulvescens* (Sclater and Salvin). GUATEMALA BARRED OWL.**

Syrnium fulvescens Slater and Salvin, Proc. Zool. Soc. Lond., p. 58, 1868—Guatemala.

Specimen collected.—Los Esesmiles, 1 (February 28, 1927).

Status.—Fairly common in February and March (probably resident) in the cloud forest of the Humid Upper Tropical Zone on Los Esesmiles.

Remarks.—Barred owls were certainly fairly common in the cloud forest on Los Esesmiles (pl. XIX) but, though at least three pairs inhabited one of the larger canyons, only one specimen was collected. Several attempts were made to find them at night with the aid of a jack-light, at first with the anticipation of certain success, for they were not only very noisy, but appeared to stick closely to limited areas. But for several reasons all such efforts resulted in failure. The owls answered readily enough the more or less inexpert attempts to imitate their calls, and several times they must have been very close indeed, but dense foliage combined with complete lack of "shine" from the birds' eyes proved too much of a handicap.

On February 28 a systematic search was made through an oak grove where a pair of barred owls had been heard the night before, and the male was finally found perched on a small, bare, horizontal branch only about six feet from the ground. This bird was perfectly tame and permitted an approach to within ten feet. Search as we would, we could not find the mate, though that night she was heard calling from the same grove.

The call-notes of this species are the same series of barking hoots uttered by the spotted owl (*Strix occidentalis*).

Colors of soft parts.—Iris, dark brown (appearing nearly black in life); cere, bill, and toes, dull yellow; claws, horn color, tipped with black.

Stomach contents.—Large insects. Beneath the perching place of the specimen collected were feathers of a motmot (*Aspatha gularis*), which bird had by inference been killed by the owl.

***Ciccaba virgata centralis* Griscom. CENTRAL AMERICAN CASSIN'S OWL. PÁJARO LEÓN.**

Ciccaba virgata centralis Griscom, Bull. Mus. Comp. Zool., 69, No. 8, p. 159, April, 1929—Chivela, Oaxaca, Mexico.

Ciccaba virgata virgata Ridgway (not *Syrnium virgatum* Cassin), Bull. U. S. Nat. Mus., 50, pt. 6, p. 763, 1914—part, San Salvador; van Rossem, Condor, 29, p. 26, 1927—El Salvador.

Specimens and records.—Lake Olomega, 1; Puerto del Triunfo, 1; Rio San Miguel, 2; Mt. Cacaguatique, 3; Volcán de San Miguel, 1; Chilata, 1; San Salvador, 1. Also noted at Volcán de Santa Ana. Recorded from "Salvador."

Status.—Common resident of wooded areas in the Arid Lower Tropical Zone and extending locally into the Arid Upper Tropical to 4,000 feet and the Humid Upper Tropical to 5,000 feet.

Remarks.—In some localities, notably Puerto del Triunfo, Rio San Miguel, and Mt. Cacaguatique, these owls were exceedingly common, and one or more were pretty sure to be found whenever we went night-hunting. At the three previously mentioned localities the peculiar note, a curious, guttural combination of growl and hoot, was one of the night voices most frequently heard. The birds appear to go in pairs the year round, and there is usually a great deal of calling between mates. The call of the male is pitched noticeably higher than that of the female.

This species is typically a woods owl and frequents, both day and night, the thickest parts of the forest. So adept at hiding is it that only twice was one found during the daytime. At San Salvador a female was flushed from a large hole near the top of a tall palm tree where she was noticed because of the shallowness of the cavity, and on Volcán de Santa Ana one was found perched about twenty feet from the ground and well concealed in the thick foliage and parasitic growth of an oak in the humid forest at 5,000 feet. They are easily decoyed at night, either by squeaking or by imitating the call-note, and, once found under any circumstances, may be observed at very close range. The eyes, in the beam of a jack-light, give no reflection whatever, but the outlines of the bird, if it be facing one, can usually easily be made out. From the rear, however, the darker-colored upperparts render these birds almost impossible to see at night even with the aid of a very bright light, unless there is a lighter, contrasting background, or unless the bird is very close indeed.

Nesting.—Nothing was learned about the breeding habits of this species. A female collected at Puerto del Triunfo on January 20, 1926, was rapidly approaching breeding condition, for several of the ova had attained a size of 3 mm. Other females taken in December, February, and March, were certainly not breeding at the time they were shot.

Colors of soft parts.—Adults: iris, dark brown (nearly black); cere, pale olive-green; bill, paler and nearly white at tip; toes, variable; pale, brownish horn-color, olive-green or pale, dull yellow, apparently regardless of sex, although possibly because of age; claws, similar to feet, tips dusky.

***Ciccaba nigrolineata nigrolineata* Sclater. BLACK AND WHITE OWL.**

Ciccaba nigrolineata Sclater, Proc. Zool. Soc. Lond., p. 131, 1859—Southern Mexico.

Specimens collected.—Lake Olomega, 2 (April 22, 1926).

Status.—Uncertain. Probably a rare resident of the Arid Lower Tropical Zone.

Remarks.—The only record we have of the occurrence of this owl in El Salvador is that given above. These two birds, male and female, were shot by Morales, who found them perched side by side in the swamp forest on the north shore of Lake Olomega. It is apparent that this species is not common anywhere and certainly, if it had been present locally in any great numbers, some would have been detected at night.

***Pulsatrix perspicillata saturata* Ridgway. SOOTY SPECTACLED OWL.**

Pulsatrix perspicillata saturata Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 758, 1914—Santo Domingo, Oaxaca, Mexico; *ibid.*, La Libertad; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 24, 1918—San Salvador.

Ciccaba perspicillata Salvin and Godman (not *Strix perspicillata* Latham), Biol. Centr.-Am., Aves, 3, p. 28, 1897—part, La Libertad.

Specimens and records.—Lake Olomega, 4; Barra de Santiago, 1; Colima, 2; El Carmen, 1. Also noted at Hacienda Zapotitán. Recorded from La Libertad; San Salvador (probably in error).

Status.—Fairly common resident of the lowlands and locally in the interior, as at Colima and Zapotitán.

Remarks.—These specimens are browner and less blackish sooty, with more prominent wing and tail markings and more broken, less uniform breast-bands than is usual with this race. With one exception all have immaculate feet and tarsi, and nearly immaculate (unbarred) underparts. However, all are deeply colored below and are probably best referred to *saturata*.

It is possible that the San Salvador record is erroneous. Dr. Hellmayr writes us in regard to the specimen, which was obtained by Cory in exchange from Count Berlepsch and is now in Field Museum, that the skin was originally purchased from the dealer Kemp at Bonn, Germany in January, 1886. On the back of the museum label is a note, "I do not believe in the correctness of the locality. The bird looks like *P. p. perspicillata* from S. America. R. R. [idgway]." Dr. Hellmayr informs us further that the specimen appears to be indistinguishable from Surinam and Venezuela skins.

From the present series it would seem that younger birds are more prominently (less uniformly) marked dorsally than are older ones. Age is also evidently, at least in part, responsible for the width and uniformity of the pectoral band, those specimens possessing the narrowest and most broken bands being obviously the youngest.

The true home of these large owls is in the swamp forests of the coastal plain, although some localities inland which present favorable associations are also inhabited by them. The species is, for example, fairly common in the marshes at Zapotitán, and along the heavily wooded banks of the Lempa River at Colima.

It is probable that they go in pairs throughout the year, and that the young of the year remain with the parents long after they are able to take care of themselves. At Lake Olomega on August 2, 1925, a pair was found perched in plain view on large horizontal branches under the forest crown. When they were shot, a fully grown, but still downy-headed, juvenile flew from close by and was taken. The pair collected at Colima on January 24, 1927, was found sitting side by side in a large tree near the river. Attention was attracted to them when one flew down to the ground to capture a large grasshopper and then returned to its perch. There was a third owl in the same tree, which by assumption was the young of the year belonging to this pair. Likewise at Barra de Santiago on April 6, 1927, three were found in the same tree, perched in plain sight over a forest stream. Two were sitting side by side and probably constituted the pair of adults. The third, which was sitting only a few feet from the pair, was collected. In spite of the date this bird, a female, showed no signs of breeding, and she was evidently a bird of the previous year still in company with the parents. Single birds were found on two occasions, once when one was shot at night at El Carmen on February 15, 1926, and again when one was seen in a large tree over the Rio Sucio at Zapotitán on June 19, 1927.

A surprising circumstance connected with all of the spectacled owls seen was their indifference to concealment when choosing their roosting places. Most of them were plainly discernible from some distance, for the customary perch was on a large, leafless, horizontal branch where the buff-colored underparts showed up very plainly in contrast with background foliage.

Nesting.—It would seem certain that this species is a late spring nester and that one or two eggs probably constitute the normal number. One full-grown young was found with its parents at Lake Olomega on August 2, 1925, and a pair of two-thirds-grown young were seen at Zapotitán on June 15, 1912. May 1 is, therefore, the most likely date for egg laying.

Plumage notes.—Adults taken August 2 and August 27 are in complete molt. A pair of adults taken January 24 are likewise undergoing a very extensive molt, including many remiges and rectrices. What is evidently a one-year-old female was in complete molt on April 6.

Colors of soft parts.—Adults: iris, bright yellow; cere and toes, bluish horn-color; bill, pale greenish, nearly white terminally; claws, black. Nearly grown juvenile: similar, but cere slate-color and bill dusky, greenish yellow.

Stomach contents.—Small mammal and caterpillar, 1; small mammal, 1; large grasshoppers, 1; small bird remains, 3. One bird smelled very strongly of skunk, probably *Spilogale*.

Order CAPRIMULGIFORMES. Goatsuckers and Allies

Family NYCTIBIIDAE. Potoos

Nyctibius griseus mexicanus Nelson. MEXICAN GIANT GOAT-SUCKER.

Nyctibius jamaicensis mexicanus Nelson, Auk, 17, p. 260, July, 1900—Metlatoyuca, Puebla, Mexico.

Nyctibius griseus van Rossem (not *Caprimulgus griseus* Gmelin), Condor, 29, p. 27, January, 1927—Salvador (habits).

Specimens and records.—Olomega, 2 (October 30, 1925); Puerto del Triunfo, 1 (January 12, 1926); Rio San Miguel, 1 (February 7, 1926); El Carmen, 1 (February 15, 1926). Also noted at Volcán de San Miguel (March 19, 1926). Recorded from "Salvador."

Status.—Probably fairly common resident of the Arid Lower Tropical Zone.

Remarks.—One of the five examples collected was prepared as a skeleton. The other four appear to be typical of the Mexican race. The three females are noticeably darker below than the single male, and it is not improbable that accurately sexed specimens will show this to be normally the case.

Morales was the first to take specimens of this giant goatsucker when, during a night hunt in the woods near the village of Olomega, he secured two on October 30, 1925. These proved to be a male and female and, as they were shot in the same patch of woodland, may have been a mated pair, although they were not in breeding condition. Both were "very high" in trees when shot. Like the other three shot subsequently, they were located by the glow from their eyes, which, like those of most goatsuckers, reflect a brilliant red from the beam of a hunting lamp. The third specimen was taken from the top of a fifteen-foot stub in an open grass pasture at Puerto del Triunfo. The fourth, taken at Rio San Miguel, was on a fence post at the edge of the clearing in the river forest, and the fifth, shot at El Carmen, was on a stub overlooking a brushy pasture. All were very easily approached within short, shotgun range. On the evening of March 19, 1926, one was seen flying about over a grass-covered lava flat at 2,700 feet on Volcán de San Miguel. It made frequent sallies from the woods just below and could be seen catching very large beetles, of which there was an abundance. The flight lacks the dash and lightness of nighthawks, and the wing beats are slower.

Plumage notes.—Both of the specimens taken on October 30 are just finishing a complete molt. There is no trace of plumage change in specimens taken in January and February.

Colors of soft parts.—Iris, bright orange-yellow, appearing only as a narrow, nearly obsolete ring when the pupil is fully expanded; bill, horn color (nearly black); feet, grayish horn-color; and claws, dull black.

Stomach contents.—Large insects, beetles, and moths, 1. One bird was also seen catching some very large flying beetles.

Family CAPRIMULGIDAE. Goatsuckers

Antrostomus carolinensis (Gmelin). CHUCK-WILL'S-WIDOW.

Caprimulgus carolinensis Gmelin, Syst. Nat., 1, pt. 2, p. 1028, 1789—South Carolina.

Antrostomus carolinensis van Rossem, Condor, 29, p. 26, January, 1927—Salvador (habits).

Specimens and records.—Lake Olomega, 1 (September 11, 1925); Divisadero, 1 (October 1, 1925); Rio Goascorán, 1 (October 26, 1925); Barra de Santiago, 1 (April 7, 1927). Recorded from "Salvador."

Status.—Fairly common spring and fall migrant through the Arid Lower Tropical Zone. Most frequently encountered in the forests of the coastal plain.

Remarks.—Chuck-will's-widows were seen as late as October 29 at Rio Goascorán, where they were more common than in any other locality. Besides the one collected four others were seen there on dates ranging from October 26 to 29, 1925. Except for the Divisadero record most were found well up in trees, once as high as a hundred feet above the ground, and so wild that collecting them was usually impossible. At Lake Olomega one flew from tree to tree through the high forest and at no time permitted an approach closer than about a hundred yards. Two were seen at Divisadero on October 1, 1925. The first was found on the ground in a tangle of brush and vines and was captured by hand by Morales. It was in good condition and, although no injury could be found, it must have been hurt in some way, for Morales said it could not rise from the earth. The other was seen in a hillside maguey field but was too shy to be taken.

The usual daytime locations were large, horizontal branches twenty feet or so from the ground and in rather heavy woods. The only spring record (Barra de Santiago) was in such a situation. The bird squatted parallel to the branch and was seen only by accident. Only two were found after dark. for most of the night-hunting was done in midwinter or in the early summer when the migrations were over. More night work in the springtime would probably have resulted in several additional records, for detection of this and other goatsuckers by "shining" is usually an easy matter, not only because of the bright red eye reflection, but also because after dark they are very much tamer than in the daytime.

Caprimulgus vociferus vociferus Wilson. EASTERN WHIP-POOR-WILL.

Caprimulgus vociferus Wilson, Amer. Orn., 5, p. 71, pl. 41, figs. 1, 2, 3, 1812—eastern United States (probably near Philadelphia); Hartert, Cat. Birds Brit. Mus., 16, p. 568, 1892—part, La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 385, 1894—part, La Libertad.

Antrostomus vociferus van Rossem, Condor, 29, p. 27, January, 1927—Salvador (habits).

Antrostomus vociferus vociferus A. O. U. Check-list, ed. 3, p. 196, 1910—Salvador; ed. 4, p. 173, 1931—Salvador; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 515, 1914—La Libertad; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 132, 1918—Salvador.

Specimens and records.—Mt. Cacaguatique, 10 (December 1 to 20, 1925); Puerto del Triunfo, 3 (January 3 to 20, 1926); Colima, 1 (January 21, 1927); Rio San Miguel, 1 (February 8, 1926); Los Esesmiles, 1 (February 10, 1927); Volcán de San Miguel, 1 (March 15, 1926). Recorded from La Libertad ("February," 1891).

Status.—Common midwinter visitant. While occurring in all associations and zones from sea level to at least 8,000 feet, it is perhaps most common in the Arid Upper Tropical oak association at about 3,500 feet altitude. Extreme dates of arrival and departure are December 1 and March 15.

Remarks.—It is not likely that whip-poor-wills arrive much before the first of December. Although not a great deal of night-hunting was done before that date, still, had whip-poor-wills been present, it is probable that at least a few would have been detected.

The following summary of observations on this bird has previously been published.¹ "*Antrostomus vociferus* is not a ground feeder in our experience, covering about twenty-five birds, nor were individuals ever discovered directly on the ground, even during the daytime. One was found dozing on a small oak branch, half an inch thick, which was lying on the ground beside some bushes; but with this exception every one was perched on a twig or branch at heights varying from a few inches to six feet. Their night or hunting stands were invariably at the edge of an open space and there was evidence that the same place was used night after night. We saw, on several consecutive evenings, whip-poor-wills at the identical spots where first seen, and there was no reason to suspect them of being other than the same birds. The daytime perches often had sufficient excrement under them to indicate a fixed roosting place. The eyes of this species seem to have the power of reflecting light even more brilliantly than those of *Nyctidromus*. We saw one on a stump in a cornfield at a hundred paces, and the glow at that distance was plainly visible. This bird was characteristically tame and allowed me to approach within about fifteen feet before taking flight. Once in the air it made every effort to outmaneuver the beam, for it was strongly averse to leaving the locality, and for several minutes the glaring red eyes—sometimes one and sometimes two—whirled and

¹ Condor, 29, p. 27, 1929.

zigzagged and spiraled before coming to rest on a low dead branch in the bordering fringe of forest trees. If alarmed, whip-poor-wills often faced us squarely, showing both eyes as if binocular vision was used, although ordinarily only one eye at a time is seen."

Observations of about a dozen more birds during the field work of 1927 did not differ in any significant respect from those made in 1925 and 1926. At Los Esesmiles in February, 1927, *vociferus* was more common than the resident race which was then breeding. Besides the single specimen of *vociferus* preserved at that station, two more were brought in by natives, but so badly mutilated by shot that they were not saved.

In the series collected the grayish and reddish and also the dark and pale extremes are present, but all are referable to the eastern United States race.

Caprimulgus vociferus vermiculatus (Dickey and van Rossem).

EL SALVADOR WHIP-POOR-WILL.

Antrostomus vociferus vermiculatus Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 130, June 29, 1928—Los Esesmiles, Chalatenango, El Salvador.

Specimens collected.—Los Esesmiles, 2 (February 24; March 5, 1927).

Status.—Rare breeder (probably resident) of both Arid and Humid Upper Tropical Zones in the cordillera.

Remarks.—The females of *vermiculatus* may be distinguished from the females of *A. v. vociferus* as well as of *A. v. chiapensis* by the very much redder coloration throughout and in being vermiculated with narrow transverse bars of rusty and black. The male of *vermiculatus* is unknown.

The female which is the type of *vermiculatus* had an egg in the oviduct and was with a male which was doubtless its mate. Both birds were flushed together from the ground at the base of a large pine tree at 7,500 feet in the cloud forest, but though the female flew only a few feet, the male went on into the dense woods and could not be relocated on this or succeeding days. The second female, taken March 5, was in a grove of pines standing as an isolated clump in an area of fern bracken at 6,000 feet. She, also, would have laid the following day. When shot she was in the lower dead branches of a pine tree. Whip-poor-wills were sometimes heard calling from an old cornfield which had been cut and burned out of the cloud

forest at 8,000 feet. One male taken there was the North American form, *vociferus*, but some of the others heard may have been of the present race.

Nyctidromus albigollis intercedens Griscom. CENTRAL AMERICAN PARAUQUE. CABALLERO DE LA NOCHE. PUCUYO.

Nyctidromus albigollis intercedens Griscom, Amer. Mus. Novit., 379, p. 8, October 17, 1929—Tela, Honduras.

Nyctidromus albigollis Hartert (not *Caprimulgus albigollis* Gmelin), Cat. Birds Brit. Mus., 16, p. 587, 1892—part, La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 393, 1894—part, La Libertad; Volcán de San Miguel; van Rossem, Condor, 29, p. 25, January, 1927—Salvador (habits).

Nyctidromus albigollis albigollis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 537, 1914—part, La Libertad; Volcán de San Miguel.

Specimens and records.—Lake Olomega, 23; San José del Sacare, 1; San Salvador, 2; Divisadero, 1; Mt. Cacaguatique, 1; Rio San Miguel, 6; Puerto del Triunfo, 10; Rio Goascorán, 10; Chilata, 1; Lake Guija, 1. Also noted at Volcán de San Miguel; Colima; Barra de Santiago. Recorded from Volcán de San Miguel; La Libertad.

Status.—Common resident of the Arid Lower Tropical and contiguous parts of the Arid Upper Tropical Zone. The center of abundance at all seasons is the coastal plain, although the vertical range is from sea level to 3,600 feet.

Remarks.—After careful comparison of El Salvador birds with good series of *intercedens* from northern South America, Panama, and Costa Rica, we fail to find over the whole of this territory any differences which are not fully covered by the extraordinary individual variation to which all races of the species appear to be subject. The El Salvador series as a whole, however, averages slightly paler than birds from northern South America and Costa Rica, a condition to be expected because of geographical approach to the pale races of southern Mexico. The parauque appears to be permanently resident throughout its El Salvador range, and it is doubtful if there is even a local migratory movement.

This species is by far the most common of the local goatsuckers, and when one is in suitable territory, a dozen or more are likely to be encountered daily. Coyol-palm thickets (pl. XVIII) are especially favored daytime retreats, and during the fall and winter it was not unusual to flush five or six birds from a single clump. At Lake Olomega during late August and September, 1925, a dense coyol

patch of about 100 feet by 50 feet always harbored from half a dozen to twenty or more. When flushed they almost invariably returned to the original spot after the danger was past.

This species seems not at all handicapped by daylight and once frightened is not easily approached a second time. Of course during the daytime many individuals are overlooked, for they have a habit of lying close and not flushing until almost stepped on, and it is only at night, when hunting with a jack-light, that one gains a comprehensive idea of actual numbers present in a locality. Under such circumstances it is not unusual to meet with a score of birds, and more than once fully a hundred were encountered during a night's hunting.

About dusk the parauques commence to leave the undergrowth where they have been concealed during the day and to gather in open fields, along roads and the edges of ponds. At Puerto del Triunfo they were not uncommon along the tide flats. Once they have arrived at the feeding grounds, very little flying about is done, for this species is a ground feeder, and the well-developed legs permit a vertical leap of eighteen inches or more, apparently aided somewhat by a flip of the wings. When a light is held steadily on them, they will soon commence a series of vertical jumps, giving at the top of each jump the weird calls from which their native name is derived. On moonlight nights they are especially active, and then their wailing cries are heard continuously. The hunting stands are on the ground—a custom to which only one exception was found—and it is pretty certain that in feeding habits this species is primarily terrestrial.

So mysterious a bird as the parauque and one which is so universally known might be expected to figure prominently in native folklore. Such proved to be the case, and many legends and stories have grown up around "Don Pucuyo." He is supposed to be very much of a Don Juan, in spirit at least, and to exert a more or less malign influence over women; indeed his presence in the vicinity of a hut has been known to produce pregnancy in virgins.

Nesting.—Two nests were found. In each case the two eggs were deposited in a slight depression in the soil with no concealment whatever. The first, found on April 14, 1927, was in a small clearing in the jungle just above tidewater at Barra de Santiago. The eggs were placed on the bare ground with the nearest bushes three feet away, and during the hottest hours of the day the female was exposed to the full heat and glare of the sun. The second set was found on

May 24, 1927, in a grove of small trees at Lake Guija and was shaded for most, if not all, of the day. Both of these sets were found through the use of a jack-light, the red glow from the eyes disclosing the sitting birds. The coloration of the eggs could by no stretch of the imagination be called concealing. On the contrary they are exceptionally conspicuous. The incubation in both of these sets was about two-thirds completed, so that the first week in April would appear to be about the proper date to expect the first fresh sets. Measurements of the eggs are: set no. 1: 29.7×19.7 ; 28.7×20.2 ; set no. 2: 31.7×22.4 ; 30.6×22.4 . In color they are "salmon buff" liberally sprinkled with shell markings of various shades of lilac and with ill-defined spots of "carrot-red" and "flesh-ochre."

The young stay with the parents until some time after they are fully grown, as shown by the fact that even as late as August one very frequently encounters family groups of two adults and two young of the year.

Plumage notes.—Young birds which have assumed the post-juvenal plumage may be distinguished from adults by the narrower, more pointed, and usually impurely colored tail feathers and by the buffy edgings and mottlings on the tips of the primaries. The juvenal primaries which are worn until the bird enters the second fall (first annual) molt, are from 5 to 10 mm. shorter than those of adults. Males, at least, breed the first spring as shown by dissection of several specimens. The annual molt of adults takes place in August and September.

Colors of soft parts.—Adults: iris, nearly black; tarsi, light, reddish brown; feet and bill, dark brown. Fully grown juveniles: similar, but tarsi flesh color and feet pale, reddish brown.

***Chordeiles acutipennis micromeris* Oberholser. CENTRAL AMERICAN NIGHTHAWK.**

Chordeiles acutipennis micromeris Oberholser, Bull. U. S. Nat. Mus., 86, p. 100, 1914—Xbac, Yucatán, Mexico.

Specimens collected.—Puerto del Triunfo, 6 (December 13, 1925 to January 8, 1926); Rio San Miguel, 1 (February 6, 1926); Volcán de San Miguel, 1 (March 14, 1926).

Status.—Common midwinter visitant and spring migrant, occurring with and over much the same range as *texensis*. Probably a fall migrant also, but definite data and specimens are lacking.

Remarks.—The distinctions between *micromeris* and *Chordeiles a. inferior* of Lower California are slight indeed, and were it not for

the intervening *texensis* it would be difficult to maintain both names. In the case of the eight El Salvador specimens two are very similar to specimens of *inferior* from Lower California, but under the circumstances we prefer to call them *micromeris*.

Although *micromeris* has not been recorded as breeding south to Costa Rica, there are three specimens in the Dickey collection (nos. 22,693, 22,694, 22,695) from El Pelón, Guanacaste, collected by A. P. Smith on July 30 and August 1, 1928. All three are females which apparently are duplicates of Yucatán specimens. They measure in wing, 158 mm., 165, and 162, respectively.

This race apparently does not breed in El Salvador and occurs only as a migrant and winter visitant. In relative numbers it appears to be a very poor second to *texensis*, for at Puerto del Triunfo a sight classification of the hundreds of nighthawks zigzagging over the mud flats after sunset resulted in a proportion of about one "small" to ten "large" birds.

***Chordeiles acutipennis texensis* Lawrence. TEXAS NIGHTHAWK.**

Chordeiles texensis Lawrence, Ann. Lyc. Nat. Hist. N. Y., 6, No. 27, p. 167, Dec., 1857—Texas (Ringgold Barracks near Rio Grande City; Oberholser, 1914).

Chordeiles acutipennis texensis Oberholser, Bull. U. S. Nat. Mus., 86, p. 103, 1914—La Unión; van Rossem, Condor, 29, p. 28, January, 1927—Salvador (habits).

Specimens and records.—Puerto del Triunfo, 7 (December 31, 1925 to January 8, 1926); Rio San Miguel, 1 (February 5, 1926); San José del Sacare, 1 (March 14, 1927); Volcán de San Miguel, 3 (March 15 to 24, 1926). Also noted at Rio Goascorán (October 26, 1925); San Miguel (November 11, 1925); Colima (January 26, 1927). Recorded from La Unión (January, 1864).

Status.—Abundant winter visitant and migrant in the Arid Lower Tropical and locally in the Arid Upper Tropical Zones. Although observed as high as 3,600 feet, its metropolis is along the seacoast. Extreme dates of arrival and departure are October 26 and March 24.

Remarks.—Although no specimens could be collected, it is probable that the majority of the hundreds of nighthawks seen on the fall dates given above belong to this form. At Puerto del Triunfo hundreds of these nighthawks appeared shortly after sundown over the tide flats in front of the town, on first appearance flying at some height toward the sunset and later, in the dusk, flying in the opposite

direction and close to the water and mud. After real darkness had set in they were found on the ground, most frequently in open, sandy places such as cornfields. The visibility on sandy ground is, of course, much better than on leaf mold or similar dark surfaces, and it may well be that this species has not so good a nocturnal vision as have some of the other *Caprimulgidae*. The eyes of *texensis* reflect pale, dull green and not the bright red of most members of the family. This, in itself, does not appear to have any bearing on the case,¹ but their semidiurnal habits argue the necessity of a certain amount of light. During the day all of the seacoast nighthawk population roosted in trees. Those collected or seen in higher and drier levels, as on Volcán de San Miguel and at San José del Sacare, were more often on the ground.

This form is probably much more common in winter than *C. a. micromeris* for, although a nearly equal number of each subspecies was collected, a special effort was made to secure smaller birds and, therefore, the number taken does not reflect the real proportions.

Order MICROPODIFORMES. Swifts and Hummingbirds

Family MICROPODIDAE. Swifts

Chaetura richmondi Ridgway. RICHMOND'S SWIFT.

Chaetura richmondi Ridgway, Proc. Biol. Soc. Wash., 23, p. 53, April 19, 1910
—Guayabo, eastern Costa Rica.

Specimens collected.—San Salvador, 4 (April 11, 24, 1912).

Status.—Noted certainly only in April in the foothill region in the vicinity of San Salvador. Probably occurs throughout the country (above the coastal plain) at all seasons of the year.

Remarks.—Small swifts which were probably *richmondi* were recorded in the field as follows: Divisadero, October 15 and 16, 1925; Mt. Cacaguate, almost daily from November 20 to December 23, 1925; San Salvador, March 13, 1912; San José del Sacare, March 14, 1927; Volcán de San Miguel, March 17, 1926, and Volcán de Santa Ana, May 15, 1927. They were seen high in the air, either in small numbers mingled with *Streptoprocne zonaris* or in large flocks containing upward of 200 birds. Large flocks were the rule in the fall and winter and smaller ones in the spring. The birds which were taken at San Salvador were flying back and forth across a grassy pasture in company with some rough-winged swallows. The two collected on April 24, 1912, in that locality were in full breeding condition and

¹ Van Rossem, Condor, 29, pp. 25–28, 1927.

may have been residents. The Volcán de Santa Ana record is that of a single pair seen flying together over a meadow at 4,500 feet. As above stated, the identification of the numerous small swifts which could not be collected is purely provisional, but all of the birds recorded had every appearance of belonging to this species.

Griscom¹ considers this swift to be a race of *C. vauxi*, a course in which we should be inclined to concur except for several considerations. First, the breeding ranges of the two forms are separated by a distance of some 1,500 miles. This, while not in itself an argument for retaining full specific standing for these species, is a factor to be considered. Furthermore, if the small gray swifts, *vauxi*, *gaumeri*, and *richmondi* are to be reduced to conspecific status, then *Chaetura pelagica* must also be considered. This Griscom has not done.

***Aëronautes saxatalis nigrior* Dickey and van Rossem. CENTRAL AMERICAN WHITE-THROATED SWIFT.**

Aëronautes saxatalis nigrior Dickey and van Rossem, Condor, 30, p. 193, May 15, 1928—Los Esesmites, Chalatenango, El Salvador.

Aëronautes saxatalis nigrior Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 192, 1932—Salvador (crit.).

Specimens collected.—Los Esesmites, 2 (February 26, 1927).

Status.—Fairly common in midwinter and early spring (probably resident) along the crest of Los Esesmites. Observed between 6,000 and 8,500 feet.

Remarks.—White-throated swifts were seen almost daily during our stay at Los Esesmites, and their actions left little doubt that they were breeding somewhere nearby. There are some precipitous cliffs at the western end of the range, but these were not accessible from our base camp and were not visited, although on the way up the mountain, on February 1, many swifts were observed near them. White-throated swifts are known to be resident at Duenas, in southern Guatemala, throughout the year.² We have examined two specimens from this colony (nos. 30,836 and 30,837, U. S. National Museum) and have found both of them to be identical with El Salvador birds.

White-throated swifts were most active on bright, sunny days, and at such times they could be heard and sometimes seen through open spaces in the foliage as they darted back and forth over the cloud forest. When the woods were covered with cold, driving mist,

¹ Bull. Amer. Nat. Hist., 64, p. 196, 1932.

² Biol. Centr.-Am., Aves, 2, p. 368, 1892.

the swifts worked lower, beneath the clouds and over the open ridges and pastures. It was on one of these occasions that the only two specimens obtained were collected. At such times they were very often associated temporarily with flocks of violet-green swallows.

***Streptoprocne zonaris mexicana* Ridgway. MEXICAN COLLARED SWIFT. GOLONDRINA LIGERA. MARTÍN.**

Streptoprocne zonaris mexicana Ridgway, Proc. Biol. Soc. Wash., 23, p. 53, April 19, 1910—Rio Seco, near Córdoba, Vera Cruz, Mexico.

Specimens and records.—Mt. Cacaguatique, 7 (November 29 and December 9, 1925); Sonsonate, 1 (July 19, 1925). Also noted at Lake Olomega (September 14, 1926); Divisadero (September 22 to October 23, 1925); San Miguel (November 10, 1925); Ciudad Barriós (November 16, 1925); Puerto del Triunfo (throughout January, 1926); Volcán de San Miguel (March 17, 1926); San José del Sacare (March 14, 1927).

Status.—Common throughout the year below 4,000 feet altitude but possibly not breeding within the boundaries of the republic.

Remarks.—The eight specimens collected are, both immature and adult, typical of *mexicana* both in color and size.

There are many cliffs on Mt. Cacaguatique which would seem to offer every attraction as nesting sites but, although the swifts were swarming in the locality, none of those collected showed (in November and December) the slightest signs of breeding, and the young of the year were full-grown and commencing the postjuvinal molt.

The greatest assemblages are seen during the midwinter months. On Mt. Cacaguatique flocks of fully a thousand were sometimes noted, but the usual size of a flock was about 200. They usually appeared after midday as a whirling cloud high in the air. Later they spread out and worked back and forth over the ridge crests, later to regather into a compact swarm and move on to the next ridge or series of ridges. It was noticeable that on hot, cloudy afternoons these swifts fed very much lower than when the weather was clear, and at such times almost skimmed the treetops along the ridges. If one was fortunate enough to be on the right ridge at the right time, it was possible to collect occasional specimens, providing one could hit them, for they were utterly indifferent to human presence. At about an hour before sundown they gathered for the last time, spiraled upward to a great height and finally vanished, to reappear the next afternoon. In January, 1926, at Puerto del

Triunfo a flock of two hundred or more circled low over the town and mud flats every afternoon and after an hour disappeared.

The flocks noted in fall and spring were normally small and consisted of an average number of perhaps a dozen birds.

Plumage notes.—Birds of the year taken November 29 and December 9 are just commencing the postjuvenile molt, which appears to include the tail, but not the remiges. Adults taken the same date are just completing the annual molt.

Colors of soft parts.—Adults and birds of the year: bill and claws, black; iris, tarsi, and feet, brownish black.

***Streptoprocne zonaris albicincta* (Cabanis). COLOMBIAN
COLLARED SWIFT.**

Hemiprocne albicincta Cabanis, Journ. für Orn., 10, p. 165, 1862—Guiana.

Specimens collected.—Mt. Cacaguatique, 1 (November 21, 1925).

Status.—Uncertain. Detected only as a midwinter casual on Mt. Cacaguatique.

Remarks.—The single specimen of this race, a female of the previous year, is not distinguishable from Costa Rican specimens of similar age. It is more intensely black throughout than either adults or young of *mexicana*, and the forehead and chin are uniform with the rest of the head instead of paler as in *mexicana*. It is also slightly smaller, the wing measuring 194, while in *mexicana* regardless of sex or age it averages about 205. Huber¹ has described a race, *S. z. bouchellii*, from the Atlantic slope of Nicaragua, giving as the only character separating it from *albicincta* the broken, sometimes nearly obsolete, chest band. As this is the invariable character found in one-year-old (postjuvenile) birds of both *mexicana* and *albicincta*, we are inclined to suspect that *bouchellii* was based on immature birds.

If *albicincta* is at all common as far north as latitude 14° N. and inland to 84° 26' W., the locality from which *bouchellii* was described, there is no reason why it should not stray occasionally to the west coast.

Family TROCHILIDAE. Hummingbirds

***Doricha enicura* (Vieillot). SLENDER SHEAR-TAIL. BURIÓN,
GURIÓN, CHUPA ROSA (all hummingbirds).**

Trochilus enicurus Vieillot, Nouv. Dict. d'Hist. Nat., 23, p. 429, 1818—
"Brazil" (error).

¹ Auk, 40, p. 302, 1923.

Specimens collected.—Los Esesmites, 2 (February 23, 24, 1927).

Status.—Uncommon in February in Arid Upper Tropical Zone on Los Esesmites. Probably resident.

Remarks.—The hard, sharp buzz of this hummingbird was heard very seldom and then only about low, thick brush and vine tangles on the south slopes of Los Esesmites. Although both specimens were taken at 7,500 feet, the species was seen as high as 8,500 feet in an old cornfield which had become choked with a head-high growth of bushes and vine tangle. Only females were noted.

Colors of soft parts.—Females: iris, bill and feet, brownish black.

Archilochus colubris (Linnaeus). RUBY-THROATED HUMMINGBIRD.

Trochilus colubris Linnaeus, Syst. Nat., ed. 10, 1, p. 120, 1758—South Carolina; Salvin, Cat. Birds Brit. Mus., 16, p. 667, 1892—La Libertad.

Specimens and records.—Divisadero, 5 (October 22; November 2, 3, 1925); Rio San Miguel, 4 (February 10, 11, 19, 21, 1926); Volcán de Conchagua, 2 (February 26, March 2, 1926). Also noted at Puerto del Triunfo (December 31, 1925 to January 27, 1926); Volcán de San Miguel (March 11 to 17, 1926). Recorded from La Libertad (February).

Status.—Common winter visitant to the Arid Lower Tropical Zone; most abundant in the lowlands where, at times, it outnumbers all other species combined. Arrives October 22 and remains as late as March 17, at least. Noted from sea level to 3,500 feet.

Remarks.—It appears that the great bulk of male ruby-throated hummingbirds seek other winter quarters, for females were very much in the majority wherever the species was met with. In midwinter at Puerto del Triunfo, where more ruby-throats were seen than all other species of hummingbirds put together, females outnumbered the males about ten to one. This was not an extreme instance, for in some other places (notably in March on Volcán de San Miguel) no males were seen at all. At this late date, however, it is possible that the males had already departed for the north.

In winter quarters ruby-throats were found in almost any situation from the palm thickets of the coastal forest to the open hillsides just below the summit of Conchagua, but the preference was for open, sunny places such as thin, second-growth, gallery forest and about the edges of clearings. Considering the great winter range of the species and its reported abundance at several points over a vast

territory, the ruby-throat would seem to be one of the most, if not the most, numerous of all hummingbirds.

Plumage notes.—In February and March both adults and young go through a complete molt, and at this time the young males acquire the red throat of maturity. Most individuals have completed this molt, by the first week in March. When the primaries are in molt, the buzz seems to vary a great deal, depending on what feathers are being renewed; therefore it was no uncommon experience to shoot a hummingbird whose buzz proclaimed it to be a total stranger, only to have it turn out to be the common ruby-throat.

***Atthis heloisa ellioti* Ridgway. ELLIOT'S HUMMINGBIRD.**

Atthis ellioti Ridgway, Proc. U. S. Nat. Mus., 1, p. 9, July 1, 1878—Volcán de Fuego, Guatemala.

Specimen collected.—Volcán de Santa Ana, 1 (May 8, 1927).

Status.—Uncertain.

Remarks.—The above specimen, an adult female, which was collected in the low scrub in the crater (7,200 feet), was the only one noted.

Colors of soft parts.—Iris, blackish brown; bill, black, basal one-half of mandible, flesh-colored on tomia; tarsi and feet, dark brown.

***Eugenes fulgens* (Swainson). RIVOLI'S HUMMINGBIRD.**

Trochilus fulgens Swainson, Philos. Mag., n. s., 1, p. 441, 1827—Temascaltepec, Mexico.

Specimens collected.—Los Esesmiles, 6 (February 2 to 22, 1927); Volcán de Santa Ana, 3 (May 10, 1927).

Status.—Fairly common resident in the Arid Upper Tropical Zone on Los Esesmiles and Volcán de Santa Ana.

Remarks.—Rivoli's hummingbird was found only among the oaks and pines and among the scrubby, flowering growths between 7,000 and 8,000 feet on the south slope of Los Esesmiles, and about some flowering agave plants scattered over rocky portions of the summit of Volcán de Santa Ana at 7,200 feet.

Very little was discovered concerning the general habits of Rivoli's hummingbird, save that many individuals customarily spent a great deal of time, when not actually feeding, in the topmost branches of the oaks. Several specimens were taken through being seen prominently outlined against the sky as they perched on the topmost twigs of dead-topped trees. On Volcán de Santa Ana three young males were shot as they came to feed at the red flowers

of a tall agave plant on the very edge of the crater. In this latter locality they were extremely shy, which was not the case on Los Esesmiles, and to obtain specimens it was necessary to hide behind nearby bushes. Several birds were seen besides the three collected, but they were off like a shot at the first movement of the collector.

Nesting.—No nests were found. On February 12, 1927 on Los Esesmiles, a female, acting very much as though she had a nest nearby, was seen gathering spider webs from the middle heights of a patch of tall oaks at 7,000 feet. She was characteristically shy and refused to go to her nest although watched for nearly half an hour. Dissection showed her to contain an egg with shell partially formed. A female taken in the same locality February 22, while not laying at the time, would have been ready shortly. The three young males taken on May 10, 1927, were probably products of the winter nesting season. Evidence of a late fall nesting is furnished by a female, still in pure juvenal plumage, which was taken on Los Esesmiles on February 8, 1927. Possibly this species, like *Calypte anna* in California, breeds practically the year round.

Plumage notes.—Three males (of-the-year) taken on Volcán de Santa Ana, May 10, 1927, had just commenced the postjuvenal molt, and were in the same stage of development as a young male from the Huachuca Mountains of Arizona, taken July 18, 1901.

Colors of soft parts.—Adults: iris, blackish brown; bill, black, tomia narrowly flesh-colored basally; feet and claws, blackish brown. Juvenal female: similar, but feet light brown and tomia of mandible more broadly flesh-colored basally.

***Chlorostilbon canivetii osberti* Gould. GUATEMALAN EMERALD.**

Chlorostilbon osberti Gould, Proc. Zool. Soc. Lond., p. 309, 1860—Dueñas, Guatemala.

[*Chloanges*] *Caniveti Osberti* Simon, Hist. Nat. des Troch., p. 68, 1921—part, El Salvador.

Chlorostilbon canivetii Salvin (not *Ornismya canivetii* Lesson), Cat. Birds Brit. Mus., 16, p. 656, 1892—part, Volcán de San Miguel, La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 263, 1892—part, Volcán de San Miguel; La Libertad.

Chlorostilbon canivetii osberti Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 556, 1911—Acajutla; La Libertad; Volcán de San Miguel; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 203, 1918—Salvador.

Specimens and records.—Lake Olomega, 2; Volcán de Conchagua, 3; Volcán de San Miguel, 1; Puerto del Triunfo, 1; Rio San Miguel, 1;

Mt. Cacaguatique, 3; San Salvador, 1; Monte Mayor, 1; Lake Guija, 1; Barra de Santiago, 1; Lake Channico, 1. Recorded from La Libertad; Volcán de San Miguel.

Status.—Common resident everywhere in the Arid Lower Tropical Zone and, locally, in the oak association of the Arid Upper Tropical Zone as high as 3,500 feet.

Remarks.—There is apparently no difference between extreme western and extreme eastern El Salvador specimens of this hummingbird, and none of them shows any approach to *C. c. salvini* of Costa Rica and Nicaragua. The presence of grayish tips to the central rectrices of the males is, we believe, largely a matter of immaturity, and their presence or absence is of doubtful value in distinguishing races of this species.

This hummingbird is numerically about on a parity with *Saucerottia devillei*, though possibly slightly less common, and therefore is the third most abundant member of the family in El Salvador. There would seem to be no particular center of population, for individuals were as common in the Mt. Cacaguatique oaks at 3,500 feet as they were at any location on the coastal plain. Although characteristically an undergrowth species, special conditions such as a blossoming ceiba will entice many birds temporarily well above the ground. On Volcán de San Miguel numbers of females and young of both sexes were found about small bushes in the lava ravines as high as 3,000 feet, though no adult males were noted above the upper limits of the coffee shade at about 2,700 feet. The typical habitat is coyol palm and other undergrowth in the lowlands. None was seen in the pines or oaks at San José del Sacare, so that only locally does the species reach above the lower zone limits. The cloud forests on Los Esesmiles and Volcán de Santa Ana are entirely too cold to offer a suitable habitat.

While very active and, hummer-like, inclined at times to be pugnacious, the Guatemalan emerald is not to be compared in degree of irritability with *S. devillei*. During the courting season in mid-winter the males are exceedingly active and noisy. Their high, thin squeak, given while perched on bare twigs low to the ground, greatly resembles that of *Hylocharis leucotis pygmaea*—so much so that considerable acquaintance was necessary before the two could be distinguished with certainty.

Nesting.—Males taken during November, December, and January were in full breeding condition. Young of the year become common

after the first week in March. Apparently there is only one nesting season a year, for juveniles were encountered only in the months of March and April.

Plumage notes.—A complete molt takes place just after the breeding season. It commences in early April, and in one case was still incomplete on May 27. Both adults and young are affected at the same time. The molt commences about the foreparts and dorsal surface and, of the body plumage, the ventral portions are the last to be replaced. This results, in some young males, in a superficial resemblance to some of the buff-bellied species of *Amazilia*.

Colors of soft parts.—Adult male: bill, black, basal third of maxilla and approximately basal half to three-fourths of mandible, coral-pink; iris and feet, brownish black. Adult female: similar, but maxilla entirely blackish brown (no basal pink portion).

***Abeillia abeillei abeillei* (Delattre and Lesson). ABEILLE'S HUMMINGBIRD.**

O[rnisyma] abeillei Delattre and Lesson, Rev. Zool., p. 16, 1839—Jalapa, Vera Cruz, Mexico.

Specimens collected.—Volcán de Santa Ana, 2 (May 6, 14, 1927); Volcán de San Salvador, 1 (June 1, 1912).

Status.—Fairly common in midsummer (and possibly resident) in the Humid Upper Tropical Zone of the volcanic coastal range. The vertical range is from 4,500 to 6,500 feet.

Remarks.—These three specimens have the larger size and dark, emerald-green coloration of the northern race and show no approach to *A. a. aurea* Miller and Griscom from the mountains of Nicaragua.

On Volcán de Santa Ana, Abeille's hummingbirds were fairly common between the altitudes of 4,500 to 6,500 feet, where they kept to the sparse undergrowth beneath the larger forest trees. Their flight is direct and swift, and in the filtered light of the deep woods they can be very easily overlooked. At trees in flower they may be locally abundant, and at one station on Volcán de Santa Ana they were swarming by scores. They are not tolerant of rain, and an assemblage will disappear entirely with the first drops of a passing shower.

***Lampornis amethystinus salvini* (Ridgway). GUATEMALAN CAZIQUE.**

Delatiria henrica salvini Ridgway, Proc. Biol. Soc. Wash., 21, p. 195, October 20, 1908—Calderas, Volcán de Fuego, Guatemala.

Specimens collected.—Los Esesmiles, 6 (February 6 to 28, 1927).

Status.—Fairly common, but very local, in the cloud forest of the Humid Upper Tropical Zone on Los Esesmiles. Detected only at 8,000 feet.

Remarks.—The six specimens are satisfactorily referable to this race. The throats of all are very uniform in color and are very close to "phlox purple"; the pure white, supra-auricular streak is banded above by a black line, and the auriculars are dead black, faintly glossed posteriorly with metallic green. The measurements of these six birds, all males, are as follows: wing, 63.5–68 (65); tail, 37.5–41 (39); culmen, 20–22 (20.8).

Guatemalan caziques were fairly common about flowering shrubs in clearings and along the edges of the cloud forest, but their constant motion made the collection of specimens somewhat difficult. The species was found in greatest numbers about a thicket of purple flowering bushes in an open space at the bottom of a ravine at 8,000 feet where, on sunny days, a half-dozen or more were usually in sight at once. At intervals between feeding flights they perched on twigs under the foliage, and it was by lying in wait beneath the feeding bushes and using a small caliber collecting pistol, that most of the specimens were taken. No females were taken or observed.

Plumage notes.—The single adult and the five young of the year were completing the annual and postjuvenile molts, respectively, on the dates of capture. The postjuvenile males are precisely like the adult in general coloration, but the purple throat feathers are restricted to a patch about 14 mm. long by 10 mm. wide, the extreme upper throat being dark gray like the chin. In the adult the throat patch extends laterally very much farther, in fact to the buffy rectal streak, and is about 15 mm. wide across the posterior portion. The lateral rectrices in the adult have very obscure, almost obsolete, gray tips, very much darker than the tips of the postjuvenile lateral rectrices. The underparts of the body are slightly paler in the young than in the adult.

Colors of soft parts.—Postjuvenile male: bill, black, tomia of mandible, pale brown; tarsi and feet, dusky flesh-color.

***Lampornis viridipallens connectens* Dickey and van Rossem.**
EL SALVADOR MOUNTAIN GEM.

Lampornis viridipallens connectens Dickey and van Rossem, Proc. Biol. Soc. Wash., 42, p. 209, September 10, 1929—Los Esesmiles, Chalatenango, El Salvador.

Specimen collected.—Los Esesmites, 1 (March 5, 1927).

Status.—Of rare occurrence in spring, and presumably resident, in the cloud forest on Los Esesmites.

Remarks.—This race, the link in many respects between *L. v. viridipallens* and *L. v. sybillae*, was the rarest of the hummingbirds found on Los Esesmites, and none was seen there other than the single male collected. It was found at the bottom of a deep ravine at 8,000 feet, at a place where some fallen trees permitted the entrance of the sunlight necessary for the existence of a dense thicket of flowering shrubs. This same patch was much frequented by *Lampornis amethystinus salvini*.

Plumage notes.—The single specimen had just completed the annual molt at the time of capture, March 5.

Colors of soft parts.—Adult male: feet and iris, dark brown; bill, black; tomia of mandible, flesh color.

***Lampornis viridipallens nubivagus* Dickey and van Rossem.
SANTA ANA MOUNTAIN GEM.**

Lampornis viridipallens nubivagus Dickey and van Rossem, Proc. Biol. Soc. Wash., 42, p. 210, September 10, 1929—Volcán de Santa Ana, Santa Ana, El Salvador.

Specimens collected.—Volcán de Santa Ana, 7 (May 6, 7, 1927).

Status.—Fairly common inhabitant during the month of May, and probably permanently resident, in the cloud forest of the Humid Upper Tropical Zone on Volcán de Santa Ana. The vertical range is from 5,000 to 7,000 feet.

Remarks.—The principal differences separating this local form from *Lampornis viridipallens viridipallens* of the Guatemala highlands consist in the virtual elimination of green freckling on the sides and in the darker coloration of the upperparts and wings.

On Volcán de Santa Ana, both on the main cone and on the contiguous, subsidiary hill known as Cerro de los Naranjos, these hummingbirds were fairly common throughout the cloud forest, where they kept principally to flowering shrubs in sunny spots at the bottoms of the steep-walled ravines. They did not appear to relish the thin, dimly lighted undergrowth of denser parts of the forest, for which such species as *Lamprolaima rhami* and *Abeillia abeillei* show such decided preference.

Plumage notes.—The three young males included in the seven specimens taken have finished the postjuvenile molt except for the

few dusky feathers of the juvenal plumage which still persist on the chin between the mandibular rami. The spots on the throats of these young birds are decidedly smaller than in the three adult males; otherwise the postjuvenal and adult plumages appear to be identical.

Colors of soft parts.—As in *Lampornis viridipallens connectens*.

Lamprolaima rhami saturator Griscom. HONDURAS GARNET-THROATED HUMMINGBIRD.

Lamprolaima rhami saturator Griscom, Proc. New Eng. Zool. Club, 13, p. 58, Nov. 7, 1932—Cerro Cantoral, Dist. of Achaga, Honduras.

Specimens collected.—Los Esesmites, 16 (February 5 to March 7, 1927).

Status.—Common in February and March between 7,800 and 8,500 feet in the cloud forest on Los Esesmites.

Remarks.—Garnet-throated hummingbirds were extremely common within the confines of a single ravine on the southeastern slope of the mountain, but for some unexplainable reason were apparently totally absent from adjacent areas which, so far as one could see, were precisely like it in every respect. This is all the more surprising in that they by no means remained within any particular association. The ravine in question was wooded for the most part with original, heavy forest, beneath which grew a thin, light-starved undergrowth. In one or two places the ground had been cleared and later had grown up with a dense thicket of second growth some twelve or fifteen feet high, through which one could find passage only by worming along, snake fashion, or sometimes on hands and knees. It was in the maze of dead twigs and close-growing branches under the foliage and the vine-matted roofs of these once-cleared tracts that *Lamprolaima rhami* was so common. They seldom went up to feed on the blossoms above, but stayed below and hunted tiny insects entangled in the countless spider webs. They were remarkably tame and unsuspicious. There was no difficulty in approaching them to within a few feet, and several escaped capture by hand only by a hair's breadth.

In the thin undergrowth of the forest adjacent to this area of scrub they were also common, not to the extent that they were in the bushy thickets, but sufficiently so that a dozen or more could be seen from one spot. Numbers were present also in a sunny, flower-filled open space on the narrow floor of the cañon where they worked over the blossoms in company with several other species. Both in flight and in profile, when at rest, they appear heavy, sluggish, and

lacking the vitality so characteristic of hummingbirds in general. The buzz is low and soft, for the large wings do not make a particularly rapid movement necessary.

Plumage notes.—The annual molt of the adults was practically completed by the first part of February, when the last outer primaries were being replaced. The body molt of the young of the year was then complete and the primary molt just started. There is no essential difference between old and young when the postjuvenile molt is finished. Young males average less extensively green on the sides, but otherwise there is no difference in the degree of intensity nor in the extent of the metallic or iridescent hues.

Colors of soft parts.—Adult males: iris, dark brown; feet, black; bill, black; tomia of mandible, orange flesh-color. Adult females: similar, but feet dark brown.

Colibri thalassinus (Swainson). MEXICAN VIOLET-EARED HUMMINGBIRD.

Trochilus thalassinus Swainson, Philos. Mag., n.s., 1, p. 441, 1827—Temascál-tepec, Mexico.

Specimens collected.—Los Esesmiles, 12 (February 7 to 28, 1927).

Status.—A common inhabitant of the Humid Upper Tropical Zone on Los Esesmiles and decidedly less numerous in the Arid Upper Tropical down to 6,400 feet.

Remarks.—It is quite possible that *Colibri cyanotus* and *C. thalassinus* are conspecific, since some males of *Colibri cyanotus cabanides* of Costa Rica are pronouncedly blue on the chest while some females of *thalassinus* (one El Salvador specimen is particularly noticeable in this respect) have that region nearly uniform green. However, *thalassinus* has a very weak, slim bill as compared with *cyanotus*, a difference which is striking on direct comparison, but which is not brought out by measurement and, for the present, we treat them as specifically distinct.

Mexican violet-eared hummingbirds were found only in one locality. On Los Esesmiles they ranged from 8,000 feet in the cloud forest down to 6,400 feet in the pines. This is the range for females and young of the year at this season, but whether the old males lived higher or lower was not determined. It is, however, pretty certain that none occupied the altitudinal range where females and young were common during February and early March.

This is the most conspicuous of the several species of hummingbirds found on Los Esesmites and by all odds the most numerous. It is a lover of sunshine and was found only in bright, warm clearings or in the low growth along trails, and sedulously avoided the shaded, damp undergrowth so favored by *Lamprolaima rhami saturator* and *Hylocharis leucotis pygmaea*. On sunny days it is exceedingly active and in such constant movement that the taking of a specimen was sometimes no easy matter.

Nesting.—A juvenile, just out of the nest and able to fly only a few feet at a time, was captured alive by a native and brought into camp on February 7, 1925. It was caught in a brushy ravine at about 6,400 feet and well within the Arid Upper Tropical Zone. On the basis of this one specimen nesting continues until mid-January. However, as most of the young had nearly completed the postjuvinal molt by the end of February, it stands to reason that the mass nesting is some time earlier.

Plumage notes.—Adult females and young of the year were in the annual and postjuvinal molts in February. In the adults the body molt and the renewal of the rectrices (commencing with the inner) had just commenced in three specimens taken February 19, 25, and 28, respectively, while the young of both sexes vary in plumage from pure juvinal to complete postjuvinal. In none of the nine young is there any sign of primary replacement at this stage. There is an interesting variation of the anterior parts in that the number of iridescent feathers present in the throat is extremely variable in postjuvinals. Some (regardless of sex) acquire nearly, or quite, the full number with the postjuvinal plumage, while others lack them entirely, the throat being uniform with the rest of the underparts.

Colors of soft parts.—Adult females: bill, feet, and iris, black. Juveniles: similar, but mandible flesh-colored basally.

***Anthracothonax prevostii prevostii* (Lesson). PREVOST'S MANGO.**

Trochilus prevostii Lesson, Hist. Nat. Colibris, 87, pl. 24, 1830-31—"South America."

Specimens collected.—Colima, 3 (January 22, 1927).

Status.—Detected only as a midwinter visitant to central El Salvador.

Remarks.—Considerable uncertainty surrounds the name *Trochilus prevostii* Lesson, and its employment here is more in accordance with prevalent usage than with the actual facts. Lesson's plate fits

the present species well enough; in fact it would be difficult to connect it with any other. However, the description following does not at all agree for, instead of describing the female which is pictured, the author characterizes what is unmistakably a juvenile *Anthracothorax*, but one of extremely uncertain pedigree. In the description *prevostii* is compared with the young female of the "*colibri a plastron noir*" [i.e. *Anthracothorax nigricollis* (Vieillot)], but is said, among other things, to have a shorter bill, whereas in actual practice *prevostii* has a longer bill than *nigricollis*. Dr. Hellmayr informs us that he believes *prevostii* may be synonymous with *Anthracothorax viridigula* (Boddaert). However, in view of the correctness of the plate, we prefer to retain the name, especially in consideration of the uncertainty as to just what species Lesson's description applies. The next available name in case *prevostii* is rejected is *Lampornis thalassinus* of Ridgway.¹

The three specimens listed above are less extensively black below than the average of *gracilirostris*; the chin and upper throat are bordered by green reflections instead of greenish blue; the upperparts are more bronzy green and the culmen is longer. They are not distinguishable from Mexican specimens in the U. S. National Museum. There is the possibility that this form occupies the entire plateau region of El Salvador and that *gracilirostris* is confined, so far as its local distribution is concerned, to the southeastern coastal plain. All of the birds taken were shot as they were flying about a mango tree at the edge of a small banana grove near the Lempa River.

***Anthracothorax prevostii gracilirostris* Ridgway. SLENDER-BILLED MANGO.**

Anthracothorax prevosti gracilirostris Ridgway, Proc. Biol. Soc. Wash., 23, p. 55, April 19, 1910—Bolsón, Costa Rica.

Specimens collected.—Divisadero, 1 (October 14, 1925); Rio San Miguel, 37 (February 5 to 21, 1926); Lake Olomega, 5 (April 6 to 12, 1926).

Status.—Common resident of the southeastern coastal plain and the adjacent foothills up to an altitude of 800 feet.

Remarks.—Dr. Hellmayr informs us that *Anthracothorax nigricollis nigricollis* and *Anthracothorax prevostii viridicordatus* occur together as separate species in parts of Caribbean Venezuela. This deters us from treating both *prevostii* and *gracilirostris* as forms

¹ Proc. Biol. Soc. Wash., 3, p. 23, 1885. See also Simon, Hist. Nat. des Troch., p. 276, footnote, 1921.

of *nigricollis*, although our series of 43 *gracilirostris* bridges the characters of the two supposed species through individual variation. The extensively black median underparts and the blue border of the throats of male *nigricollis* as compared to the greenish hues of *prevostii* are differences of degree only, for occasional *gracilirostris* are practical duplicates of South American birds in these respects. The black median underparts of the females of *nigricollis* are sometimes glossed with green and, conversely, extreme examples of *gracilirostris* are practically black in this respect. The tremendous individual variation in the color of the tails of both males and females is such that any color or pattern found in one can be duplicated in the other. Simon¹ says in regard to the insular *A. p. hendersoni*, "serait bien plutôt une forme de *L. nigricollis*."

This hummingbird is very common on the southeastern coastal plain, and at the season of ceiba bloom (February) half a dozen or more may be found at a single tree, buzzing at the masses of pink blossoms. Later in the season the numerous "salamo" trees (*Calycophyllum* sp.) are covered with small white blossoms, and to these come many species, including the present one. A species of white morning glory which was growing about Lake Olomega in April was also very attractive to them. The female taken at Divisadero on October 14 was seen to pick tiny spiders and insects off the window screens of a house.

Nesting.—Laying females were taken October 14 and February 9. The specimens taken in February indicate two "mass" nestings, for at that time one group of young were just completing the post-juvenal molt and another was just commencing it. Two juveniles in molt were taken as late as April 6, corresponding probably to the late laying date in February.

Plumage notes.—We think it extremely probable that the normal plumage of the fully adult female is similar to that of the male, as is the case with *Anthracothorax viridis* and possibly other species in this genus. The stages through which they go to reach this plumage are well shown in the series at hand. From the juvenal plumage with chestnut-spotted malar region and sides of throat, they molt into the type (usually designated as adult) which has blackish median underparts bounded laterally with wide white stripes. This transition is shown by ten specimens ranging from pure juvenile to completely feathered postjuveniles. Next are four which are variously intermediate between the postjuveniles and the adults, showing

¹ Hist. Nat. des Troch., p. 276, footnote, 1921.

approaching maturity in the appearance of many metallic bluish green feathers on the underparts, with corresponding restriction and breaking up of the lateral white stripes. Finally there are two which are not distinguishable dark gray. This type of plumage is not confined to *gracilirostris* but, to judge from the characters displayed by several specimens marked "male," is occasionally found in *prevostii* and *hendersoni* as well. It is hardly necessary to state that dissection is the only sure means of determining the sex of green birds. The fact that females do not attain adult plumage until several molts have elapsed is sufficient reason to account for the comparative rarity of adult stage in this sex. The males pass directly into the green plumage at the first (postjuvenile) molt and are then to be distinguished from adults only by the more rusty black abdomen, the narrow, grayish edgings on the under tail coverts, and the less metallic lateral rectrices which frequently have indications of light, apical edgings. There is also the trace of a tiny, obsolete post-ocular mark just as in the adult female, but the differently shaped tail serves to distinguish the sexes. This hummingbird has a complete molt in February, March, and April just as have most of the other species dealt with in the present work.

Colors of soft parts.—Adults and young: iris, feet, and bill, dull black.

Saucerottia devillei (Bourcier and Mulsant). DEVILLE'S
HUMMINGBIRD.

T[rochilus] devillei Boucier and Mulsant, Rev. Zool., p. 272, 1848—Guatemala.

Amazilia devillii Salvin, Cat. Birds Brit. Mus., 16, 660, 1892—La Libertad; Volcán de San Miguel; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 296, 1892—La Libertad; Volcán de San Miguel.

S[aucerottia] Devillei Simon, Hist. Nat. Troch., p. 335, 1921—Volcán de San Miguel; La Libertad.

Saucerottia devillei Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 447, 1911—(cit. of above); Cory, Field Mus. Nat. Hist., Zool. Ser. 13, pt. 2, no. 1, p. 187, 1918—Salvador.

Saucerottia beryllina devillei Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 201, 1932—Salvador.

Specimens and records.—Lake Olomega, 5; Rio San Miguel, 12; Mt. Cacaguatique, 5; Volcán de San Miguel, 6; Volcán de Conchagua, 1; Volcán de San Salvador, 1; Puerto del Triunfo, 1; Barra de Santiago, 2; Chilata, 2; Lake Guija, 1; San José del Sacare, 1; Sonsonate, 1. Recorded from La Libertad; Volcán de San Miguel.

Status.—Common resident throughout the Arid Lower Tropical Zone and extending locally into the lower margin of the Arid Upper Tropical.

Remarks.—The great variation shown by the series of 38 specimens can be accounted for only by one of two hypotheses—either that fusion on an extensive scale has taken place with *Saucerottia cyanura* or that *cyanura* and *devillei* are simply two phases of a single species. Three of the specimens (from Lake Olomega, Volcán de San Miguel, and Hacienda Chilata, respectively) are so precisely intermediate between the two species that they are as easily placed with one as with the other. Of the remainder a *good third* show *cyanura* characters in varying degree. It is not possible to be specific about the actual number, for it is difficult to draw the line between typical *devillei* and the point where *cyanura* characters begin. Fusion on such an extensive scale can hardly be called hybridism. It is, rather, complete intergradation which exhibits every possible variation between the two forms. Just how to regard *devillei* is a matter not easy to decide. *Saucerottia cyanura cyanura* ranges from the vicinity of San José, Costa Rica, northwest through Nicaragua and into extreme southeastern El Salvador. So far as we are able to ascertain, *devillei* is unknown in Costa Rica and Nicaragua. All through El Salvador *devillei* occurs to the practical exclusion of pure *cyanura*, but with *cyanura* blood evident in many specimens, while in western Guatemala both *cyanura* (as the northern race *guatemalae*) and *devillei* occur and range together north into Chiapas. Only one instance of "hybridization" has been recorded¹ from Guatemala, and none, so far as we know, from Chiapas.

To sum the matter up, it seems hardly proper to regard *devillei* as a distinct species because locally there is complete fusion in characters with *cyanura*, and yet, as both extremes of coloration occur together in southeastern El Salvador and in western Guatemala (we do not yet know details of distribution in Chiapas) it is difficult, if not impossible, to give to *devillei* a range of its own, which it would require were it treated as a geographic variety. Griscom considers *devillei* to be a race of *Saucerottia beryllina*, and perhaps he is entirely correct. However, he regards *cyanura* as specifically "very distinct." There is still much uncertainty regarding the relationships of all three forms and, until all the evidence is in, we believe each should be carried as full species.

¹ Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 448, footnote, 1911.

With the material at hand we fail to see any good reason for considering *Saucerottia* generically distinct from *Amazilia*, for the chief characters on which they are separated (the narrower bill and less exposed nasal operculum of *Saucerottia*) are subject to a great deal of variation regardless of species. The custom of collectors tying the bill by threading through the nostril often distorts the width to such an extent that the original proportions are lost. Individual variation, in bills tied at the tip and with no distortion of opercula or of relative width, seems to nullify both of the above characters if one tries to separate, generically, *Saucerottia devillei*, *Saucerottia sophiae*, *Saucerottia cyanura*, *Amazilia rutila*, *Amazilia tzacatl*, *Amazilia yucatanensis*, and *Amazilia cyanocephalus*. Of the species listed *sophiae* has, relatively, the most tumid bill. Many individual specimens of *devillei* have proportionately thicker bills and more prominent opercula than some of the species of *Amazilia*. For the present we follow current usage in employing the generic name *Saucerottia* for the two forms involved, since there are many species which we have not seen, and a reduction of *Saucerottia* to subgeneric rank would necessarily involve consideration of the type species of *Saucerottia*, *Agyrtria*, and *Amazilia*. We do, however, call attention to the fact that through some species of *Saucerottia* and *Amazilia* there is complete overlap of critical characters. Griscom has also cast doubts on the status of these so-called genera.

Although greatly outnumbered by *Amazilia rutila* in most localities, Deville's hummingbird was often abundant when concentrated at the flowering ceiba trees in February. At Rio San Miguel in that month they proved a decided nuisance, not only because of their numbers, which made the detection of rarer species correspondingly difficult, but because of their habit of fighting with every new arrival. It was exasperating to be trying to catch a glimpse of the producer of an unfamiliar wing buzz only to have the stranger suddenly assailed by one of the common Deville's hummers and driven out of sight.

This is essentially a hummingbird of undergrowth and of middle heights under the forest crown, and it seldom comes into open gardens and cleared land. Probably this is the cause of its absence from the region about Divisadero, where the original growth has been completely destroyed and replaced for the most part by open, bush-dotted, grasslands. No vertical migration was noticed, the concentration about favorite trees being purely local. In several different localities the numbers seemed to be much the same at all seasons.

Plumage notes.—Juveniles and adults were, in the main, going through the annual molt in February, at the same time as the rest of the local hummingbirds. There was considerable latitude in time, for some do not complete the molt before the end of March. In the juveniles the brownish, posterior underparts are the last to be replaced and, at certain stages, they look very much like some of the buff-bellied species of *Amazilia*.

Colors of soft parts.—Adults: maxilla, black; mandible, pinkish flesh-color, terminal one-third to one-fourth, black or dusky; iris and feet, blackish brown.

***Saucerottia cyanura cyanura* (Gould). BLUE-TAILED HUMMINGBIRD.**

Amazilia cyanura Gould, Mon. Troch., 5, pt. 18, pl. 315, September, 1859—Realejo, Nicaragua.

Specimens collected.—Rio San Miguel, 2 (February 18, 19, 1926).

Status.—Detected only in February on the eastern coastal plain.

Remarks.—The two specimens listed are typical of the southern form of the blue-tailed hummingbird. Considering the distribution of the two races of *Amazilia rutila*, this was only to be expected. Both were molting from juvenal to postjuvenal plumage. For discussion of the numerous intergrades between *cyanura* and *devillei* see under the latter. Whether or not *cyanura* is resident in El Salvador is unknown, but by inference the above specimens were probably hatched at no great distance from the point of capture.

***Amazilia rutila rutila* (Delattre). CINNAMON HUMMINGBIRD.**

Ornismya rutila Delattre, Echo du Monde Savant, sér. 2, 7, no. 45, col. 1069, June 15, 1848—Acapulco, Mexico (new name for *O. cinnamomea* Lesson, preoccupied).

Amazilia cinnamomea Salvin, Cat. Birds Brit. Mus., 16, p. 660, 1892—part, Volcán de San Miguel.

A[mazilis] rutila Simon, Hist. Nat. des Troch., p. 322, 1921—part, Salvador.

Specimens and records.—Lake Olomega, 3; Divisadero, 4; Rio San Miguel, 5; Puerto del Triunfo, 1; San José del Sacare, 1. Also noted on Volcán de Conchagua; Colima. Recorded from "Salvador."

Status.—Common, locally abundant, resident in the territory east of the Lempa River and up that stream to the upper limits of the Arid Lower Tropical Zone. Occurs between sea level and 3,500 feet, but is most numerous on the coastal plain and lower foothills (fig. 15).

Remarks.—This is the commonest resident species of hummingbird to be found in the Arid Lower Tropical Zone and is all the more noticeable because of the preference shown for the vicinity of houses and gardens. It is found in all types of cover. At Puerto del Triunfo it was abundant in the coyol-palm thickets under the dense shade of the high forest in company with *Hylocharis eliciae*; about Divisadero it was almost equally common in the low mimosa thickets, and at San José del Sacare a few were seen in the short dry brush growing on the rocky hills at about 3,000 feet altitude. On Volcán de Conchagua this hummingbird was found in similar situations at 3,500 feet.

Nesting.—A nest found at Divisadero on October 12, 1925, contained two eggs on the point of hatching. One of these measures 14.4×8.8 mm. The nest was only two feet from the ground and in a small bush on a rather open, grassy hillside. It was completely concealed by overhanging leaves and was discovered by the parent's buzzing off as the bush was touched. The type of construction was very similar to that employed by *Calypte anna* in California. A female taken at Lake Olomega on September 8 had laid only a few days before. A female of *A. r. corallirostris* was in breeding condition when shot at Sonsonate on July 13, and probably *rutila* also nests as early as that date.

Plumage notes.—The annual molt takes place between early February and early April; in the former month with the great majority of birds. Neither in *rutila* nor in *corallirostris* does there appear to be any plumage change in the fall months, for no specimens of either race taken between May 16 and January 4 show any signs of molt.

Colors of soft parts.—Bill, coral-pink basally, terminal one-third to one-half of maxilla and terminal one-fourth of mandible, blackish brown; iris, tarsi and feet, dark brown.

Amazilia rutila corallirostris (Bourcier and Mulsant). CORAL-BILLED HUMMINGBIRD.

T[rochilus] corallirostris Bourcier and Mulsant, Ann. Sci. Phys. et Nat. Lyons, 9, p. 328, 1846—Esquintla, Guatemala.

Amazilia corallirostris Sclater and Salvin, Ibis, 1, p. 130, 1859—"State of San Salvador."

Amazilia cinnamomea Ridgway (not *Ornismya cinnamomea* Lesson), Proc. U. S. Nat. Mus., 3, p. 318, 1880—part, "San Salvador"; Ridgway, Proc. U. S. Nat. Mus., 4, p. 26, 1881—part, Salvador; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 293, 1892—part, Acajutla; La Libertad.—Salvin, Cat. Birds Brit. Mus., 16, p. 660, 1892—part, La Libertad.

A[mazilis] rutila Simon (not *Ornismya rutila* Delattre), Hist. Nat. des Troch., p. 322, 1921—part, Salvador.

Amazilia rutila rutila Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 416, 1911—Acajutla; La Libertad.

Specimens and records.—Hacienda Miraflores, 1; San Salvador, 4; Lake Chanmico, 1; Barra de Santiago, 2; Sonsonate, 1. Also noted on Volcán de Santa Ana at 4,500 feet. Recorded from Acajutla; La Libertad.

Status.—Common resident of the coastal slope west of the Lempa River. Like the preceding form it is characteristically a resident

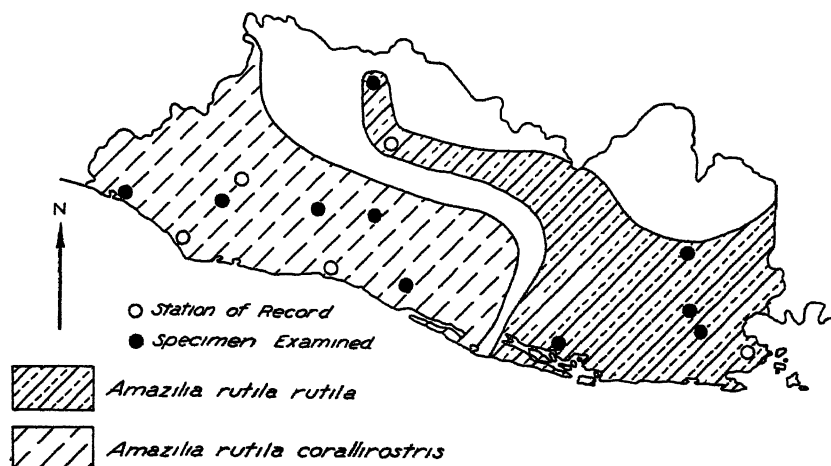


FIG. 15. Distribution of two races of the hummingbird, *Amazilia rutila*, in El Salvador.

of the Arid Lower Tropical Zone and is most abundant at lower elevations, but stragglers occur as high as 4,500 feet (fig. 15).

Remarks.—Ridgway records this species from "Salvador" under the subspecific name *rutila*, but the only localities listed by him are Acajutla and La Libertad, both of which lie well within the range of *corallirostris*. According to Salvin and Godman there is a specimen in the U. S. National Museum collected by Captain Dow at Acajutla, and this is probably the one listed by Ridgway in his measurement table. The La Libertad record of *rutila*, which Ridgway tentatively questioned, is probably taken from the *Biologia* and the *Catalogue of Birds in the British Museum*.

There is some individual variation where the two forms approach one another. Certain specimens from the eastern departments are very close to *corallirostris* and are classed as *rutila* only because most

of the birds from there are easily referable to the latter. Conversely, one of the San Salvador birds is nearer to *rutila*, but the other three from that place are typical of *corallirostris*. The bronzy upperparts of *corallirostris* afford a better character than the darkness of the lower parts, for, in the case of the latter, there is (while they certainly average darker) some variation with season. Worn specimens of both races are the lightest, and fresh-plumaged specimens the darkest. Simon considers *corallirostris* synonymous with *rutila*. However, we believe that *corallirostris* is a well-defined race which extends along the Pacific coast from Chiapas south to central western El Salvador.

***Amazilia cyanocephala guatemalensis* (Gould). GUATEMALAN AZURE-CROWNED HUMMINGBIRD.**

Cyanomyia guatemalensis Gould, Introd. Troch., oct. ed., p. 148, 1861—Dueñas, Guatemala.

Specimens collected.—Mt. Cacaguatique, 7 (November 23 to December 11, 1925); San José del Sacare, 2 (March 15, 16, 1927).

Status.—Fairly common in winter and spring, and presumably resident, in the oak-pine association of the Arid Upper Tropical Zone along the cordillera.

Remarks.—No trace of this species was discovered anywhere in the coastal range, and it is doubtful if it ever occurs there. Most of the published records of this race are from the Atlantic drainage, which would lead one to suspect that the El Salvador colony was established by an intrusion from the north.

Azure-crowned hummingbirds were first found in the oaks and adjacent coffee groves on Mt. Cacaguatique. Later they were found in the oaks and pines at San José del Sacare. The species has a habit of perching high and in relatively conspicuous places and this, combined with its white underparts, makes it a hummingbird which is not easily overlooked.

Plumage notes.—A male, taken at San José del Sacare March 16, is in the midst of the annual molt, a condition common to all of the local hummingbirds (except *Campylopterus hemileucurus*) during the late winter and early spring months. However, one of the adult males, taken on Mt. Cacaguatique November 28, is also undergoing a wing molt which involves the primaries. Whether this was an aberrant individual or whether this species has two molts a year is not known.

Colors of soft parts.—Adults: iris, tarsi and feet, dark brown; bill, black with basal three-fourths to two-thirds of mandible dull pink. This last color is close to "geranium-pink." Ridgway¹ gives "carmine" for the typical form, *A. c. cyanocephala*.

***Hylocharis eliciae* (Bourcier and Mulsant). ELICIA'S GOLDEN-TAILED HUMMINGBIRD.**

T[rochilus] eliciae Bourcier and Mulsant, Ann. Sci. Phys. et Nat. Lyon, 9, p. 314, 1846—type locality unknown.

Chrysuronia eliciae Salvin, Cat. Birds Brit. Mus., 16, pp. 251, 662, 1892—La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 311, 1892—La Libertad.

Hylocharis eliciae Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 384, 1911, (cit. of above).—Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 199, 1918—(Salvador).

H[ylocharis] eliciae Simon, Hist. Nat. des Troch., p. 312, 1921—Salvador.

Specimens and records.—Lake Olomega, 3 (April 13, 1926; September 11, 13, 1925); Puerto del Triunfo, 3 (January 3, 1926); Rio San Miguel, 3 (February 10, 19, 1926); Volcán de Conchagua, 1 (March 5, 1926). Recorded from La Libertad ("January and February").

Status.—Very uncommon resident of the Arid Lower Tropical Zone. Extremes of altitude at which this species was encountered were sea level and 3,400 feet.

Remarks.—*Elicia's* golden-tailed hummingbird is, like its close relative *Hylocharis leucotis pygmaea*, a bird of the undergrowth. In a way the ranges of the two are complementary, since *pygmaea* occupies the undergrowth of the Humid Upper Tropical Zone in the interior, while *eliciae* centers in the coastal swamp forests and extends locally up the slopes of the coast range.

The three males taken on January 3, 1926, at Puerto del Triunfo were members of a quintet which were found together in the coyol-palm thickets of the swamp forest. The space which they occupied was about fifteen by thirty feet, and their perches were on tiny twigs in tall, leafless bushes growing between the palms. Attention was first drawn to them by the chorus of squeaks, identical, so far as could be remembered, with the notes given by *pygmaea*. Each male had his own particular perching twig to which he returned again and again. After three had been collected, the two survivors finally disappeared. There is little doubt that a female was the cause of

¹ Bull. U. S. Nat. Mus., 50, pt. 5, p. 425, 1911.

such concentration and that she was concealed somewhere near, but extended search failed to find her. All of the other specimens encountered were collected singly. The three from Rio San Miguel were shot as they fed at *ceiba* bloom and were the only members of the species to be detected in that locality, although hundreds of hummingbirds were under daily observation. Those from Lake Olomega were found in the undergrowth near the lake. On Volcán de Conchagua several were seen at one time at a blossoming tree at 3,400 feet, but only one of these was secured.

Plumage notes.—Two young of the year, just commencing the postjuvinal molt, were taken at Rio San Miguel February 10 and 19, 1926. One is a male, the other a female, and both have a good number of iridescent feathers on the throat which are parts of the juvenal plumage. This condition must be comparatively rare in this family. The young male in respect to the throat spotting is equal to the average adult female, while the young female is only very lightly spotted, the blue appearing as small spots in the centers of grayish feathers. These two juveniles have the three lateral pairs of rectrices tipped with rufous.

Colors of soft parts.—Adult male: bill, coral-pink, terminal one-fourth to one-third, black; feet and iris, dark brown. Adult female: similar, but maxilla pink only from the anterior end of nasal operculum to base.

***Hylocharis leucotis pygmaea* (Simon and Hellmayr). LESSER WHITE-EARED HUMMINGBIRD.**

Basilinna leucotis pygmaea Simon and Hellmayr, Novit. Zool., 15, June 25, p. 12, 1908—Matagalpa, Nicaragua.

Specimens collected.—Mt. Cacaguatique, 7 (November 21 to December 15, 1925); Los Esesmiles, 6 (February 3 to 28, 1927).

Status.—Common in winter (breeding and probably resident) in the Humid Upper Tropical Zone of the cordillera. The altitudinal range is from 3,500 to 8,000 feet.

Remarks.—El Salvador specimens are not typical of *pygmaea*, but come within the zone of intergradation between that form and *H. l. leucotis*. In small size and more extensively white underparts they are like *pygmaea*, but in the more greenish (less bronzy) upperparts and purer (less bluish) green throats are very similar to *leucotis*. The grayish, apical spots of the lateral rectrices, given by the describers as a diagnostic character for *pygmaea*, are of questionable value, since they are probably due to immaturity. This is shown

by a specimen (No. 101180 American Museum of Natural History) from the Matagalpa region of Nicaragua which is molting from the gray-tipped to the bronze-tipped type of rectrices.

There are no differences observable between Mt. Cacaguatique and Los Esesmiles specimens. Measurements of the seven adult males from El Salvador are as follows: wing, 51–54; culmen, 13.5–15.

Simon¹ considers that *Trochilus melanotus* of Swainson must supplant *leucotis* Vieillot² as the name of this species, the latter not being certainly identifiable. However, as Vieillot's description contains only minor errors, and moreover can apply only to this species, we prefer to retain it. Moreover, acceptance of *melanotus* would invalidate *Basilinna* as a generic name (a circumstance which Simon overlooked), for its type is *Trochilus leucotis* Vieillot and, if that species is not identifiable, the name *Basilinna* of course automatically goes into the discard. If it be deemed desirable to recognize the white-eared and Xantus hummingbirds as generically distinct from *Hylocharis* (which the writers emphatically do not), and if *Trochilus leucotis* is considered dubious, then *Helhopaedica* Gould³ becomes available since it is based, by original designation, on *Trochilus melanotus* Swainson.

On Mt. Cacaguatique this was a very common hummingbird, although it was confined almost entirely to the undergrowth of the oak forests. In spite of its numbers it was very difficult to collect, for as a rule the noise of trying to force a passage to the places from which the birds were calling frightened them away, or else the foliage rendered them invisible beyond the distance of a few feet. The squeak of the males is a forcibly delivered "chup-wéet, chup-wéet," easily identifiable after acquaintance, but likely to be confused with that of *Chlorostilbon* at first. Each male has his favorite perch, and two or more males are very often found within a short distance of each other, whether for sociability or in competition for some female it was not possible to determine. On Los Esesmiles white-eared hummingbirds were found about all sorts of scrubby growth. In this locality females greatly outnumbered males, while on Mt. Cacaguatique males were much more in evidence.

Nesting.—Males were extremely active and in breeding condition in November and December. These months probably mark the

¹ Hist. Nat. des Troch., p. 313, 1921.

² Nouv. Dict. d'Hist. Nat., ed. 2, 23, p. 428, 1818.

³ Mon. Troch., 2, pl. 64 and text, 1858.

close of the breeding season, for birds taken in February were dormant and molting. Additional evidence of late fall nesting is a young male, molting from juvenal to postjuvenal plumage taken on February 3.

Plumage notes.—Two adult females taken on Los Esesmiles February 3 and 13, 1927, have finished the body molt, and the primary molt is about half completed. Two others, taken in the same place February 20 and 28, respectively, have finished even the primary molt. A young male taken February 21 has nearly completed the postjuvenal body molt, and the iridescent blue and green feathers are rapidly filling in the chin and throat. A single, adult male taken February 3 has completed the molt everywhere.

Colors of soft parts.—Adult males: bill, coral-pink with terminal one-third black; feet and iris, dark brown. Adult female: similar, but maxilla entirely black.

Campylopterus rufus Lesson. RUFIOUS SABER-WINGED HUMMINGBIRD.

Campylopterus rufus Lesson, Rev. Zool., p. 73, 1840—loc. ignot. (probably Guatemala); Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 324, 1892—Volcán de San Miguel; Salvin, Cat. Birds Brit. Mus., 16, p. 664, 1892—Volcán de San Miguel; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 361, 1911 (cit. of above); Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 198, 1932—Salvador.

Specimens and records.—Volcán de San Salvador, 3 (April 22, 1912); Volcán de Santa Ana, 1 (May 15, 1927). Also noted from Lake Olomega (September 12, 1925); Monte Mayor (between October 5 and 9, 1925). Recorded from Volcán de San Miguel (March, 1891).

Status.—Uncommon resident. Apparently confined to the open slopes of the coast range above 4,000 feet during the spring months and descending to lower levels, both coastwise and in the interior, in the fall.

Remarks.—Rufous saber-wings were found to be not uncommon on the cleared slopes of Volcán de San Salvador above 4,000 feet and in old cornfields at 5,000 feet on Volcán de Santa Ana. They were very difficult to obtain at either place, because of their habit of making long flights and only stopping an instant at such blossoms as took their fancy. This was also the case in September at Lake Olomega where a few were seen in a banana grove, but where not a single specimen was obtained during an hour's hunt for them.

The characteristic buzz is rather soft and deep-toned, and lacks entirely the sharp quality of most of the smaller hummers.

Since the genus *Platystylopterus* Reichenbach, erected for this species, is based primarily on characters of color rather than of structure, it seems to us preferable to regard it as only of subgeneric value, although Simon¹ accords it full rank.

Campylopterus hemileucurus hemileucurus (Lichtenstein).
DELATRE'S SABER-WING.

Trochilus hemileucurus Lichtenstein, Preis-Verz. . . . Vog. . . . , Mex., p. 1, 1830—Mexico.

Campylopterus hemileucurus Salvin, Cat. Birds Brit. Mus., 16, p. 664, 1892—part, Volcán de San Miguel.

Specimens and records.—Mt. Cacaguatique, 4 (November 23 to December 19, 1925); Sonsonate, 3 (July 18, 20, 1925). Also noted at Los Esesmiles (March 5, 1927). Recorded from Volcán de San Miguel (April).

Status.—Uncommon resident. Detected in summer at 1,500 feet in the lower coastal foothills near Sonsonate (probably breeding); in midwinter and early spring in the interior mountains from 3,500 to 8,000 feet, and at an unknown altitude on Volcán de San Miguel in April.

Remarks.—All of the seven specimens collected agree with examples from Mexico in the collection of the Biological Survey, and differ decidedly from *C. h. mellitus* of Costa Rica. We believe the latter race may be distinguished from true *hemileucurus* by the more violet (less bluish) color, more extensively white tail in the adult males, and by the darker underparts of the females and young males. In size *mellitus* averages slightly larger, but individual variation appears to render this character of slight value. Although rejected by Ridgway,² *mellitus* is upheld by Simon,³ and with the latter author we agree.

The only locality in which Delattre's saber-wing was found at all commonly was at the upper limit of the Arid Lower Tropical Zone on Mt. Cacaguatique in November and December, 1925. Here it was practically confined to small banana groves which were planted at intervals in steep-banked ravines. The plants were in flower at this time and the blossoms drew great numbers of tiny insects,

¹ Hist. Nat. des Troch., p. 266, 1921.

² Bull. U. S. Nat. Mus., 50, pt. 5, p. 360, 1911.

³ Hist. Nat. des Troch., pp. 30 and 266, 1921.

which proved very attractive to this and other species of hummingbirds. One specimen was taken in the underbrush of the oaks in the Arid Upper Tropical Zone, but no others were noted in such an environment. A single adult male seen in a clearing at the bottom of a ravine in the cloud forest on Los Esesmites (8,000 feet) is the only record for that region.

Nesting.—The male and two females taken at Sonsonate July 18 and 20 were tag-marked as "breeding" and this, coupled with the fact that two young of the year were well along in the postjuvinal molt as early as November 23 and December 7, indicates that Delattre's saber-wing is exceptional among local hummingbirds in that it nests in the summer months. Most, if not all, of the other resident species nest in the fall or early winter.

Plumage notes.—This species reverses the order usual to the resident hummingbirds in that it goes through a complete molt in the fall instead of in the spring. Adults and young of the year were in molt in late November and early December. These dates are somewhat later than those for the southern race *mellitius*, of which we have molting specimens from Costa Rica taken in August, September, and October.

Colors of soft parts.—Adult males: bill and feet, black; iris, dark brown. Females and young, similar, but feet dark brown.

***Anthoscenus constantii constantii* (Delattre). CONSTANT'S STAR-THROAT.**

Ornismya constantii Delattre, *Echo du Monde Sav.*, 10e ann., ser. 2, 7, no. 45, p. 1069, June 15, 1843—in text, "Guatemala" (=Bolsón, Costa Rica; Griscom, 1932).

Anthoscenus constantii constantii Ridgway, *Bull. U. S. Nat. Mus.*, 50, pt. 5, p. 350, 1911—"Salvador" (crit.).

Floricola constanti Salvin and Godman, *Biol. Centr.-Am., Aves*, 2, p. 306, 1892—part, San Salvador; Volcán de San Miguel, La Libertad; Salvin, *Cat. Birds Brit. Mus.*, 16, pp. 661, 662, 1892—Volcán de San Miguel, La Libertad; Ridgway, *Proc. U. S. Nat. Mus.*, 3, p. 313, 1880—San Salvador.

A[*anthocaenus*] *Constanti* Simon, *Hist. Nat. des Troch.*, p. 391, 1921—Salvador.

Specimens and records.—Lake Olomega, 2; Rio San Miguel, 1; Rio Goascorán, 1; Divisadero, 1; Lake Guija, 2; San Salvador, 1. Recorded from Volcán de San Miguel; La Libertad.

Status.—Uncommon resident in second growth and semiwooded areas throughout the Arid Lower Tropical Zone.

Remarks.—In view of Ridgway's remarks as to the characters shown by Guatemala and El Salvador skins, it may be well to comment on the differences, apparently due to sex and age, which are shown by the eight specimens collected. The two adult males are very dark on the underparts and seem to be in every way similar to adult males from Costa Rica. The three adult females are all definitely paler below than the males and have the iridescent feathers of the chin and throat more widely edged with gray. The two young (postjuvenal) males have throats exactly as in the adult females, but are still paler below. These females and immatures closely resemble *A. c. leocadiae* of southwestern Mexico. Therefore it is evident that age and sex play, locally, an important part in the matter of color of the underparts. Possibly a separation of El Salvador and Guatemala birds from those of Costa Rica could be made on the basis of females and young, but we have not examined Costa Rican skins.

Since the above was written Griscom¹ has determined that the majority of Guatemalan birds are *leocadiae*. The characters of the El Salvador birds are, therefore, the result of intergradation between *constantii* and *leocadiae*, but it is of interest to note that the old males resemble one race while the females and young resemble the other. The correct name for El Salvador specimens is purely a matter of choice. If sex be disregarded, the series as a whole is precisely intermediate between *constantii* and *leocadiae*.²

Constant's star-throats were met with on very few occasions, and they were usually found in light, open, gallery forest where flowers with their attendant insects were much in evidence. Insects seemed to form a large percentage of the diet, for the stomachs of three of these star-throats contained insects to the exclusion of everything else.

Nesting.—The adult female taken at Rio Goascorán on October 28, 1925, was laying. No nests were found.

Plumage notes.—Adults (2 females) are going through a complete molt at the end of May (26 and 27). The postjuvenal molt was nearly completed in two young males that were taken February 18 and April 28.

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 210, 1932.

² Considering the fact that adult males from El Salvador are very similar to, if not identical with Costa Rica adult males it is not impossible that Delattre's type came from Guatemala as originally stated by that author.

Anthoscenus longirostris pallidiceps (Gould). PALE-CROWNED STAR-THROAT.

Helimaster pallidiceps Gould, Introd. Troch., oct. ed., p. 139, 1861—Jalapa, Vera Cruz, Mexico.

Anthoscenus longirostris pallidiceps Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 349, 1911—Volcán de San Miguel, La Libertad.

Floricola longirostris Salvin and Godman (not *Trochilus longirostris* Audebert and Vieillot), Biol. Centr.-Am., Aves, 2, p. 304, 1892—part, Volcán de San Miguel; La Libertad; Salvin, Cat. Birds Brit. Mus., 16, p. 661, 1892—part, Volcán de San Miguel, La Libertad.

Specimens and records.—Volcán de San Miguel, 3 (March 17, 23, 1926); Rio San Miguel, 2 (February 14, 1926). Recorded from Volcán de San Miguel (March); La Libertad (February and April).

Status.—Although detected only as uncommon in winter and spring in the Arid Lower Tropical Zone, the species is very probably resident.

Remarks.—Notwithstanding that Simon¹ restricts the name *pallidiceps* to specimens from southern Mexico and extends the range of *A. l. longirostris* north to Guatemala, we cannot agree to this arrangement in so far as the Pacific coast is concerned. El Salvador birds are most certainly not the same as western Costa Rican examples of *longirostris*. They have the pale greenish crown and more greenish (less bronzy) upperparts of typical *pallidiceps*, and we therefore have no alternative but to call them by that name. Possibly *longirostris* will be found to occur on the Atlantic slope of Guatemala, with *pallidiceps* occupying the Pacific drainage.

Although, according to Salvin and Godman, Richardson secured a "good series" on Volcán de San Miguel and at La Libertad, only one skin from the former place and three from the latter are listed in the *Catalogue of Birds of the British Museum*. This accords with our own experience, which is that the pale-crowned star-throat is a decidedly uncommon hummingbird. Even at Rio San Miguel, where hummingbirds were swarming about flowering ceiba trees, only two single birds of this species were seen. On Volcán de San Miguel the three specimens collected were shot on different days at the same blossoming tree, at which hummingbirds from a good-sized area were feeding.

Nesting.—Fully grown juveniles were taken on February 14 and March 23, respectively, the latter evidently out of the nest but a short time.

¹ Hist. Nat. des Troch., p. 392, footnote, 1921.

Plumage notes.—Three adult males were just starting the annual molt when collected in February and March.

Order TROGONIFORMES. Trogons

Family TROGONIDAE. Trogons

Trogon violaceus sallaei Bonaparte. NORTHERN GARTERED TROGON. AURORA, AGRORA.

Trogon sallaei Bonaparte, Compt. Rend., 42, p. 955, 1856—Orizaba, Vera Cruz, Mexico.

Chrysotrogon caligatus Ridgway (not *Trogon caligatus* Goyld), Bull. U. S. Nat. Mus., 50, pt. 5, p. 786, 1911—part, Volcán de San Miguel.

Trogon caligatus Grant, Cat. Birds Brit. Mus., 17, p. 465, 1892—part, Volcán de San Miguel, La Libertad; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 500, 1896—part, Volcán de San Miguel.

Specimens and records.—Lake Olomega, 4; Puerto del Triunfo, 1; Lake Chanmico, 4; Sonsonate, 3; Volcán de San Miguel, 1; Rio San Miguel, 1; Mt. Cacaguatique, 4; Lake Guija, 1; Chilata, 1. Recorded from Volcán de San Miguel; La Libertad.

Status.—Common resident of the Arid Lower Tropical Zone and ranging upward, locally, to 4,000 feet in the Arid Upper Tropical.

Remarks.—Peters¹ has recently shown that *Trogon caligatus* of most authors is a composite of several recognizable races, two of which occur in Central America. The El Salvador series is somewhat intermediate toward the more southerly race *Trogon violaceus concinnus* Lawrence, but on the whole is decidedly closer to *sallaei* which, compared with *concinnus*, is larger and has a paler yellow ventral coloration. Although Ridgway did not recognize either of the above races, the size differences between southern and northern Central American birds are well shown in his table of measurements.

This is the most common of the five species of trogons found within the boundaries of El Salvador, where it ranges over the whole of the Arid Lower Tropical Zone and even into the oaks of the Arid Upper Tropical.

In spite of their brilliant coloration, trogons are not at all conspicuous in their native environment and if not in motion may easily be overlooked. Each species has a characteristic call-note, and it is much easier to locate them by ear than by eye. The note of the

¹ Bull. Mus. Comp. Zool., 69, No. 12, pp. 432–34, October, 1929. For use of the name *sallaei* instead of *braccatus* see van Rossem, Bull. Mus. Comp. Zool., 77, No. 7, p. 392, Dec., 1934.

gartered trogon is very much like that of the ferruginous pygmy owl and consists of the monotonous repetition of a single note. Both sexes hoot throughout the year and are just as vociferous in winter as during the breeding season. When the bird is calling, its head is thrown back until the bill points upward at an angle of about 45 degrees.

The predominance of males is a feature of all the local trogons, and in none is it more noticeable than in the present species, which habitually travels in small flocks of four or more, or even at times up to six or seven. At Lake Channmico, in June, 1912, six adult males were seen together, even though this date was in the midst of the breeding season.

Nesting.—Dissection of specimens shows the breeding season to be from early May until late July.

Plumage notes.—The annual molt of adults takes place from June to September, and occasional birds still lack the full growth of the rectrices as late as early December. It is scarcely possible that this length of time represents the molting period of individual birds. By analogy the early dates are for birds of the previous year. There is no definite sequence to the casting and renewal of the rectrices. Some individuals molt the central feathers first and others the lateral ones, while, again, one entire side may be replaced before the other. The primary molt, however, is regular and starts with the first (innermost). There is a limited spring molt on the head and foreparts.

Colors of soft parts.—Adult male: bill, pale, bluish green or greenish blue; eyering, bright yellow; iris, dark brown; feet, plumbeous. Adult female: maxilla, blackish except for rami and tips which are like mandible; mandible, light plumbeous or greenish blue; no noticeable eyering; otherwise like adult male.

Stomach contents.—Fruit pulp and small caterpillars, 1; fruit pulp and small seeds, 1; fruit pulp only, 1; berries and caterpillars, 1; mistletoe berries exclusively, 4. This species was also noted feeding on the pulp of oranges which had originally been opened by *Centurus santacruzi*. Feeding seems to be done mainly on the wing as the birds flutter for an instant before a fruit or berry cluster.

Trogon melanocephalus melanocephalus Gould. BLACK-HEADED TROGON.

Trogon melanocephala Gould, Mon. Trogon., ed. 1, pl. 12, 1838—Tamaulipas, Mexico.

Trogon melanocephala illaetabilis Cory (not of Bangs), Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 2, 329, 1919—part, "San Salvador."

Trogon melanocephalus Grant, Cat. Birds Brit. Mus., 17, p. 462, 1892—part, La Unión, La Libertad, Volcán de San Miguel; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 498, 1896—part, La Unión, Volcán de San Miguel.

Trogon melanocephalus melanocephalus Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 756, 1911 (cit. of above).

Specimens and records.—Lake Olomega, 10; Puerto del Triunfo, 1; Rio San Miguel, 1; San Sebastián, 5; Rio Goascorán, 2; Divisadero, 1. Also noted at Miraflores; Lake Guija. Recorded from La Unión; Volcán de San Miguel; La Libertad.

Status.—Common resident of the coastal plain and of suitable interior points below 1,500 feet. Occurs also, probably casually, at other and higher locations such as on Volcán de San Miguel.

Remarks.—El Salvador specimens, even from the extreme southeastern departments, show no approach to *T. m. illaetabilis* of Costa Rica. The actual meeting place of the two races has yet to be determined.

The black-headed trogon was found most commonly coastwise, where it preferred the swampiest and most humid of localities. It is the only species of trogon which was found among the mangroves, although both the gartered and elegant trogons were found in the forests just back of the mangrove belt. In habits it does not appear to differ greatly from the other lowland members of the family, but of the three species it is perhaps the most stolid and least active. All three travel in small flocks, although *sallaei* is most noteworthy in this respect. The hoot of *melanocephalus* is very different from that of *sallaei*, being a very loud and very hoarse "kaow-kaow-kaow," so guttural as to contain a distinct growling quality. This call may be heard at all times of the year. In addition there is a very musical trill, but which sex is responsible for it is not known. It was heard several times during the late summer and each time came from some member or members of family parties composed of two adults and two young.

As black-headed trogons were seldom found far from marshes or swampy areas, it is likely that the Divisadero and Volcán de San Miguel records (October and March, respectively) are those of vagrants which had wandered to these comparatively arid localities. The "San Salvador" record of Cory doubtless pertains to the country as a whole rather than to the capital city.

Plumage notes.—The annual molt of the black-headed trogon occurs somewhat later than that of *sallaei*. It seldom commences before the first of August and is complete by the latter part of October. The general sequence is much the same as with *sallaei*, but the tail molt is decidedly more regular so far as lateral symmetry is concerned. The juvenal plumage of the young males is replaced in September and October by one which has the dorsal iridescence of old males combined with the slaty chest of the females. The juvenal tail feathers are normally carried an entire year; should some be renewed because of accidental loss of the juvenal quills, the replacement feathers are of a type intermediate between adult and juvenal. As with *sallaei* there is a limited spring body molt affecting chiefly the anterior parts.

One male well along in the first annual (second fall) molt is in all respects an aberrant individual. The back, rump, and central rectrices are blue instead of green, the head and chest are strongly washed with metallic blue, and the remiges and greater wing coverts are prominently tipped with white. This condition is true of the new feathers as well as the old, both of which are present. The tail (upon which age determination is based) contains old, frayed, juvenal feathers, one replacement feather of the intermediate type, and new feathers of full maturity. The head and chest of adults of both sexes are paler and more slaty in fresh plumage and become darker with wear.

Colors of soft parts.—Adult males: bill, greenish white, varying to pale, light blue; eyering, delft blue; iris, dark brown; feet, slaty horn-color. Adult females: maxilla, black with tomia light blue basally; mandible, light bluish horn-color; eyering, delft blue; feet, bluish horn-color. Male postjuvenal: similar to adult male, but maxilla broadly blackish along culmen. Juvenal female: similar to the adult female.

Stomach contents.—Fruit pulp, 3; berries, 3; fruit pulp and a 4-inch caterpillar, 1; caterpillars exclusively (some of sphinx moth), 3. At Puerto del Triunfo this species came frequently to feed on oranges which had been drilled open by woodpeckers.

Trogon elegans elegans Gould. ELEGANT TROGON. COA, AGRORA, QUETZÁL FALSO.

Trogon elegans Gould, Proc. Zool. Soc. Lond., p. 26, 1834—Guatemala; Grant, Cat. Birds Brit. Mus., 17, p. 449, 1892—part, La Libertad, Volcán de San Miguel; Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 489, 1896—part, La Libertad, Volcán de San Miguel.

Trogonurus elegans Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 773, 1911—part, La Libertad, Volcán de San Miguel.

Specimens and records.—Lake Olomega, 5; Colinas de Jucuarán, 4; Rio San Miguel, 7; Volcán de San Miguel, 3; Lake Chanmico, 2; Volcán de Conchagua, 5; San Salvador, 1; Chilata, 1; Rio Goascorán, 4; Zapotitán, 1; Mt. Cacagatique, 1. Also noted at Puerto del Triunfo; Lake Guija. Recorded from Volcán de San Miguel; La Libertad.

Status.—Common resident of the Arid Lower Tropical Zone and, locally, of the Arid Upper Tropical to an altitude of 3,600 feet.

Remarks.—The wide range of variation shown in this large series is probably in part individual and in part geographic. So far as the 14 adult males are concerned, the tail barring averages with decidedly more white and correspondingly less black than is present in 5 adult males from Costa Rica, which latter may be taken as typical of *Trogon elegans australis* Griscom. The series is undoubtedly intermediate between *elegans* and *australis* with the males inclining toward the former and the females toward the latter. There is no question but that *ambiguus* is a form of *elegans*, and Griscom has already shown intergradation in the females. The present series, while not quite closing the gap in the males, shows that the differences between the two are, at most, those of degree. In the light-tailed extreme of *elegans* the proximal half of the inner web of the lateral rectrices is freckled and the terminal half is barred.

This beautiful trogon is more likely to be found in low trees and the scrub of cut-over land than are either of the other small species inhabiting the lowlands. In fact it might be said to be the only one of the three which really prefers such a habitat. At Rio San Miguel and Rio Goascorán, elegant trogons were particularly numerous in dense brush which was not more than ten or twelve feet high and through which cattle had forced winding trails. Even when in tall growth they have a decided tendency to stay in thick foliage and hanging vine mats rather than in plain view. Like most trogons these are rather noisy at times, and the loud, hoarse "kó-a-kó-a-kó-a" readily identifies the callers. In addition there is an alarm call, heard only when the birds are startled or apprehensive, consisting of a series of low, hollow-toned hoots, which are inaudible beyond a short distance.

The relatively great number of males is very noticeable in this species. The proportions seem to be about four males to one female. One flock of young birds encountered in the brush at Rio Goascorán

were plainly seen at very close range. Of this flock four were young males, the other a young female. In the series collected, thirteen birds are less than one year old, and of these only four are females. It might be argued that the more brilliant coloration of the old males would automatically make them much more noticeable, but this is by no means always true and besides, in the case of young birds, there is practically no distinction between the sexes so far as the color of the underparts is concerned. One is frequently impressed with the fact that even during the breeding season, when all females are paired off, there are usually to be found, in the same localities, small groups of three or four unattached males.

Nesting.—Dissection of specimens and the dates when juveniles were taken show the breeding season to extend from about May 1 to August 1. No natives who were questioned had any idea as to where these birds breed. Even so keen an observer as Morales had no information to contribute on this point.

Plumage notes.—The spotted, juvenal plumage is changed for the postjuvenal plumage almost before the bird is fully grown. So far as the body plumage proper is concerned, there appears to be not the slightest average difference between adult and postjuvenal females. The age of birds of either sex may be determined by the character of the rectrices and remiges and some of the wing coverts since all of these feathers are normally carried until the first annual molt. Postjuvenal males are exactly like the females so far as the underparts are concerned. Dorsally they are like old males except that there is less iridescence on the head. This postjuvenal molt takes place in the late summer or early fall and is normally complete by the end of October or, rarely, not until late in November. Approximately three months seems to be necessary for its entirety. During the following winter the young males acquire scattered red feathers on the underparts and metallic green ones on the chest. There is great variation in this respect. In the spring (April) there is a very extensive body molt in which many more green and red feathers are acquired, but young males apparently do not attain complete adult body plumage until the following fall. The adults commence the annual molt in late July. It is at its height in mid-August and is complete, normally, by the end of October. The primaries are molted regularly as in *sallaei* and *melanocephalus*, and the tail follows the irregularities noted for those species. The spring molt of adults (March and April) is limited and consists of the acquisition of a few feathers on the foreparts.

Exactly as noted in *sallaei* there is occasional replacement of juvenal rectrices during the course of the first year. These occasional feathers are marked like the corresponding ones in the adults, but are decidedly narrower.

Colors of soft parts.—Adult male: bill, waxy orange-yellow; iris, dark brown; feet, pale brownish or olive-greenish; eyering, orange. First winter male: bill, brownish orange; eyering, dull orange or orange-yellow. Juvenal male: similar to the immature male. Adult female: bill, dull chrome-yellow; eyering, orange to orange-red. The soles of the feet in all are dull yellow, lighter in young, more dusky in older birds.

Stomach contents.—Caterpillars and grasshoppers, 2; small beetles, grasshoppers, and fruit pulp, 1; berry pits and pulp, 6; fruit pulp and caterpillars, 4; fruit pulp and grasshoppers, 1. It is notable that the food of this species appears to contain a proportionately greater amount of animal matter than does that of the forms which customarily range higher above the ground.

Trogon collaris puella Gould. JALAPA TROGON.

Trogon puella Gould, Proc. Zool. Soc. Lond., 13, p. 18, 1845—Esquintla, western Guatemala.

Specimen collected.—San José del Sacare, 1 (March 13, 1927).

Status.—Of rare occurrence in spring in the pine association of the Arid Upper Tropical Zone of the cordillera. It is probably a permanent resident.

Remarks.—Griscom's¹ recent description of an intermediate race in eastern Panama makes it necessary to consider *puella* as a race of *T. collaris* Vieillot.

Although eight days were spent at San José del Sacare, the Jalapa trogon was noted on but three occasions, and little was learned concerning it beyond the fact that it is very rare and very shy. On March 13, in addition to one solitary, non-breeding male which was collected from the top of a fifty-foot pine, the scattered feathers of another were found in a pine grove which was much frequented by a pair of *Accipiter chionogaster*. Still another male was seen the next day in a grove of pines near camp, but he proved too wild to be taken.

This species seems to be much quieter than *elegans*, for no trogon call-notes were heard at any time during the eight days of collecting in the one locality where it was found.

¹ Bull. Mus. Comp. Zool., 69, p. 162, 1929.

Colors of soft parts.—Adult male: bill, dull yellow; iris, dark brown; tarsi and feet, brownish horn-color; eyering, dusky brown.

Pharomachrus mocinno mocinno De la Llave. QUETZÁL.

Pharomachrus mocinno De la Llave, Registro Trimestre, 1, num. 1, p. 48, January, 1832—Guatemala.

Specimens collected.—Los Esesmites, 5 (February 8 to 26, 1927).

Status.—Fairly common resident of the most heavily forested portions of the Humid Upper Tropical Zone (8,300 to 9,000 feet) on Los Esesmites. Reported to have occurred formerly in the same zone on the coastal volcanoes, but now almost certainly extinct there.

Remarks.—Four adult males possess the golden green coloration and wide supracaudal plumes of typical *mocinno*. The plumes average shorter (740 mm.) than the measurements given by Ridgway¹ for Guatemalan males (822), but are decidedly longer than the average he gives (647) for males of *costaricensis*. Except for the shorter (but not narrower) supracaudal plumes, El Salvador birds appear to be typical *mocinno*.

The heavily forested crest of Los Esesmites, an area of not more than twenty square miles, constitutes the last stand of these magnificent birds within the boundaries of El Salvador (pl. XIX). Even here they live only in the most secluded parts, entirely avoiding cleared areas, the smaller second growth, or even the immediate vicinity of the ill-defined trails which lead nowhere in particular and along which not half a dozen people a month may pass. Routine collecting trips up the mountain seldom produced so much as the glimpse of a quetzál save that one might be seen in the distance, flying across from one ridge crest to another.

On February 4, under the guidance of three native hunters, the first hunt for quetzáls was made. The day was typical of the conditions on the northern slope. There was a dense, cold, driving fog which obscured everything beyond the range of a few yards and through which the great trunks of the forest trees showed as through smoke. The undergrowth was principally of large tree ferns and the ground was covered with fallen trees, branches, and deep leaf mold, all more or less concealed beneath a carpet of moss. The fog, condensing on the foliage and the parasite-covered trunks and branches, dripped down steadily, and within an hour everyone was thoroughly soaked and chilled through. Under these conditions it was almost

¹ Bull. U. S. Nat. Mus., 50, pt. 5, p. 739, 1911.

unbelievable that not a mile away was the dry, sunny Arid Upper Tropical slope of pines and deciduous oaks, on which rain or fog does not fall for six months in the year. The route led over a succession of steep ravines and alternating ridges, extremely difficult going not alone because of steepness, but also on account of the slippery nature of the ground. Twice notes were heard which the natives said were made by quetzáls, and subsequent experience proved them to be right. A sight was obtained of two birds, evidently a pair, as they flew from the top of a high tree, but they could not be relocated in the fog and moving, wind-thrashed foliage. This was the total success for the entire day so far as quetzáls were concerned. On the 8th a mated pair was located and shot. It is not improbable that these were the same birds which had been seen on the first day. On the 10th a small flock of four or five old males (evidently there is an excess of males in this species also) was found in the very tops of the highest trees on the side of a ravine, and two of these were shot. Soon after this date the discovery that black chachalacas (*Penelopina nigra dickeyi*) were partial to the same forest areas as the quetzáls, led to spending much time in search of these and other rarities. If desirable or necessary it would have been a rather easy matter to have collected far more than the four males and the single female which were required to determine the systematic status of the El Salvador colony. Males were often seen flying from one ridge top to another, the long feathers streaming like rocket tails. Sometimes they would suddenly "climb," make a sudden turn, and dive headlong into the forest below. The nearly vertical flight, quick flip, and headlong dive were startling similar to an airplane's loop. The flight is strong, very swift, and almost noiseless. Several times in the woods birds passed like a streak, and there could be heard only the slightest suggestion of a wing whisper. A falcon in similar flight would have been audible enough.

The call, of the males at least, is a deep, two-noted hoot, the first note being somewhat the higher. To an imitation of this they will sometimes respond by promptly flying in to investigate. On February 26 a male was heard hooting repeatedly from the very summit of the mountain. At the second answer he came down the steep slope like a bullet, swerving with perfect skill through the tree trunks and when he alighted not twenty feet away, immediately gave several hoots, possibly as a challenge. One wonders how an ear so keen as to detect the exact spot from where the sound came could have been deceived by the very inaccurate imitation.

Information as to the former range in El Salvador is meager, but there is no doubt that quetzáls once lived on the higher volcanoes along the coast as well as in the interior mountains. The owner of a large coffee plantation on Volcán de San Salvador, a Mr. Soundy, used to see occasional birds before so much forest had been removed, and said, in 1926, that the last one about which he had any certain knowledge had been killed and brought to him by a native about forty-three years before. This would place the date somewhere around 1885. There were persistent reports from the natives that quetzáls were still present, although very rare, in the more secluded parts of the cloud forest on Volcán de Santa Ana, but we found no trace of them. An old German named Carlos Kreitz who, in the "eighties," collected some birds in various parts of El Salvador and Honduras stated that he had found this species on Volcán de San Vicente during his collecting days. San Vicente is now stripped of large timber practically to the summit, and even at the top there remains scarcely a trace of the original heavy forests which once grew there.

The days of the remnant on Los Esesmiles are probably numbered, not because of the destruction of the birds themselves, but because year by year the forested area grows smaller. As the fertility of the cornfields on the lower slopes becomes exhausted, the natives fell new tracts of forest, leave the timber to dry for a season, and then burn it. There are still great areas in the adjacent parts of Honduras where conditions are ideal and where the birds will persist for a long time, but on Los Esesmiles another twenty or twenty-five years will, at the present rate of destruction, see the passing not only of the quetzal, but of the most beautiful tract of primitive woodland in the country.

Nesting.—Although quetzáls were in pairs in February and early March, the specimens taken were not nearly ready to breed at that time. The popular though fallacious belief that this species nests in horizontal hollow branches which contain two entrances was just as firmly fixed among the people of Los Esesmiles as elsewhere. Quetzáls, in the Department of Vera Paz, Guatemala,¹ are known to nest in natural cavities of trees in early June.

Plumage notes.—The single female, an adult as shown by the remiges and rectrices, differs so remarkably from an adult female of *costaricensis* in the Dickey collection and from Ridgway's description of the adult female of that form, that it may be well to describe it,

¹ Biol. Centr.-Am., Aves, 2, p. 484, 1896.

especially as Ridgway could not, in default of a specimen, describe a female of *mocinno*. Compared with the adult female of *costaricensis* it exhibits the following characters: rectrices wider (comparatively, about as in the males of the two races) and with white areas wider and black bars narrower; top and sides of head duller and less metallic green; narrow circumorbital space mouse gray; underparts (except under tail coverts, anal region, and adjacent areas) between "mouse gray" and "light mouse-gray" instead of "hair brown"; pectoral region washed with dull, slightly metallic, bluish green instead of bright, metallic, almost iridescent green; throat, lores, and forehead light "hair brown." It measures as follows: wing, 200 mm.; tail, 220; exposed culmen 18.5; from base, 22.5; tarsus, 19; middle toe, 20.0. Salvin and Godman's¹ condensed description of a female from Volcán de Fuego, Guatemala, agrees closely with the above.

All of the four males and the single female were undergoing a limited body molt, particularly about the head and foreparts, in February.

Colors of soft parts.—Adult male: bill, orange-yellow; tarsi and feet, dull orange-brown; iris, nearly black. Adult female: bill, dull black, streaked obliquely from nostril forward and downward with yellow; tarsi and feet, olive-brown; iris, nearly black.

Stomach contents.—Fruit pulp exclusively. Salvin and Godman state that caterpillars are also eaten. Fondness for caterpillars seems to be common to most species of trogons.

Order CORACIIFORMES. Kingfishers, Motmots, and Allies

Family ALCEDINIDAE. Kingfishers

Megaceryle alcyon alcyon (Linnaeus). EASTERN BELTED KINGFISHER.

Alcedo alcyon Linnaeus, Syst. Nat., ed. 10, 1, p. 115, 1758—South Carolina. *Streptoceryle alcyon alcyon* Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 415, 1914—La Libertad.

Specimens and records.—Puerto del Triunfo, 2 (January 13, 16, 1926); San Salvador, 1 (April 10, 1912); Barra de Santiago, 1 (April 11, 1927). Also noted at San Salvador (March 12, 1912); Lake Ilopango (March 18, 1912); Rio San Miguel (February 2, 1926); Barra de Santiago (April 1 to 11, 1926); Puerto del Triunfo (December 30, 1925 to January 27, 1926). Recorded from La Libertad.

¹ Biol. Centr.-Am., Aves, 2, p. 481, 1896.

Status.—Common midwinter visitant and spring migrant coastwise and, in lesser numbers, along rivers and lakes inland. Extreme dates of arrival and departure were December 30 and April 11.

Remarks.—The four specimens collected are referable without question to the smaller, eastern form. One is an adult female and three are males of the year.

No belted kingfishers had arrived at Lake Olomega by September 20, 1925, and localities suitable for the species were not visited until December 30, when it was found to be common at Puerto del Triunfo. It is probable that in the interval the fall migration had passed through, for Carriker¹ states that these birds arrive in Costa Rica by the end of October.

At Puerto del Triunfo from December 30, 1925 to January 27, 1926, belted kingfishers were fairly common and stable in numbers. Thus there was probably a stationary winter population in that area. The Barra de Santiago population in April, on the other hand, was fluctuating, birds being very common on some days and rare on others. Probably this was for the most part a population of migrants through the locality. The Lake Ilopango and San Salvador records are apparently those of transients, almost certainly so in the case of the bird taken at the latter locality on April 10.

Plumage notes.—Two young males taken January 13 and 16 have numerous blue feathers appearing in the pectoral band. In one taken April 11 the band is composed almost entirely of new feathers. Evidently the change from postjuvinal to first spring plumage is very gradual.

Megaceryle torquata torquata (Linnaeus). RINGED KINGFISHER.
MARTÍN PESCADOR (for all kingfishers).

Alcedo torquata Linnaeus, Syst. Nat., ed. 12, 1, p. 180, 1766—Mexico.

Streptoceryle torquata torquata Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 409, 1914—Salvador.

Specimens and records.—Lake Olomega, 4; San Sebastián, 5. Also noted at Puerto del Triunfo; Rio San Miguel; Lake Guija; Barra de Santiago. Recorded from "Salvador."

Status.—Common resident coastwise and along the larger rivers and lakes inland, below 1,500 feet.

Remarks.—The ringed kingfisher is of general distribution along the coast where it shows decided preference for mangrove lagoons.

¹ Ann. Carnegie Mus., 6, p. 491, 1910.

Locally, the species is almost equally common on fresh water wherever there is a plentiful supply of small fish. It is notable, though, that the species attains its upward limit at Lake Guija at 1,450 feet, and seems to be absent from the higher lakes such as Ilopango. It is customarily solitary, although local conditions such as a very favorable stream may result in a number being found at one point. A great deal of territory may be covered by individual birds, for they seem to have regular routes along lake borders and rivers with look-out perches at intervals of every few hundred yards. In activity this species is far ahead of any of the other resident kingfishers and evidently prefers to range widely for its prey rather than to stake out a limited, private preserve.

Nesting.—At San Sebastián in late July, 1912, nest holes were occasionally noted in vertical sandy banks. In size these holes were on an average four inches wide and three inches high at the entrance. Those investigated went straight back into the bank, in one case, as far as six feet. This particular burrow then may have made a turn, but it was not dug out. Specimens taken in July were in full breeding condition, and a female taken August 24, 1925, was evidently incubating at the time. A pair was observed July 21, 1912 flying excitedly back and forth in front of a bank of earth at San Sebastián. The cause of their anxiety was found to be a heavy wooden pole which some native had thrust into the nest hole, thus effectually blocking the entrance. It is not known whether this nest held eggs or young at the time.

Plumage notes.—A male taken August 23 has commenced the annual molt, but this must be earlier than usual for three other adults taken August 15, 21, and 24 show no signs of it.

Colors of soft parts.—Adults: bill, black, greenish horn-color basally; tarsi and feet, greenish horn-color; iris, dark brown.

Stomach contents.—Remains of small fish, 2.

Chloroceryle amazona (Latham). AMAZON KINGFISHER.

Alcedo amazona Latham, Index Orn., 1, p. 257, 1790—Cayenne.

Specimens and records.—Lake Ilopango, 1 (March 18, 1912); Lake Guija, 2 (May 24, 27, 1927). Also noted at Lake Chanmico (June 5, 1912); San Miguel (November 11, 1925).

Status.—Rare resident on lakes and streams in the interior. Noted between 300 and 2,000 feet.

Remarks.—Although its total range covers an immense expanse of territory, the Amazon kingfisher appears nowhere to be common. In El Salvador it is extremely rare, for a total of twenty-three months in the field resulted in seeing only seven individuals. The specimen taken at Lake Ilopango was on a dead branch overhanging the water, as was also the one seen at Lake Chanmico. At San Miguel a single bird was seen sitting on a telephone wire stretched, a good hundred feet above the water, across the San Miguel River just north of the town. Those taken or seen at Lake Guija were probably members of a single family, for four birds were several times seen together along a small stream flowing between steep sandy banks. The two collected were a young male just completing the postjuvenile molt, and an adult male. These four Lake Guija birds were nearly always to be found on branches overhanging a vertically cut sandbank at a bend in the stream. In this bank were several holes, some of which had been drilled by motmots, but one or more may well have been the former nest holes of the group seen there.

Plumage notes.—A young male collected May 27 is just finishing the postjuvenile molt. In this bird the molt is complete and includes remiges and rectrices. An adult male taken May 24 is not molting.

Colors of soft parts.—Adult male: bill, dull black, touched with orange-brown at angle of gonys; tarsi and feet, dull black; iris, dark brown.

**Chloroceryle americana septentrionalis (Sharpe). TEXAS
KINGFISHER.**

Ceryle americana, subsp. *Ceryle septentrionalis* Sharpe, Cat. Birds Brit. Mus., 17, p. 134, 1892—Teapa, Tabasco, Mexico; *ibid.*, "San Salvador."

Ceryle septentrionalis Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 476, 1895—part, La Libertad.

Chloroceryle americana isthmica Ridgway (not *Ceryle americana isthmica* Goldman), Bull. U. S. Nat. Mus., 50, pt. 6, p. 428, 1914—"San Salvador"; La Libertad.

Specimens and records.—Lake Chanmico, 3; San Salvador, 9; San Sebastián, 1; Divisadero, 3; Lake Guija, 1; Barra de Santiago, 1; Puerto del Triunfo, 1. Also noted at Lake Ilopango; Lake Olomega; Monte Mayor; Rio Goascorán; Rio San Miguel; Colima; Chilata. Recorded from La Libertad; San Salvador.

Status.—Common resident throughout the Arid Lower Tropical Zone on all fresh-water lakes, streams, and marshes below 2,300 feet (pl. XXIV), and also coastwise in the mangrove belt.

Remarks.—El Salvador birds of this species belong without question to the northern race and not to *isthmica*, to which Ridgway in default of specimens, provisionally referred them, although Sharpe and also Salvin and Godman had previously placed them correctly. In size the sixteen adults measure as follows: wing, 82–87 mm.; tail, 55–61; culmen from base, 47–52. In coloration they possess the white-streaked foreheads, more extensively white-spotted wings, indistinct submalar streak, and less heavily spotted underparts which distinguish *septentrionalis* from *isthmica*. In view of this we are surprised to note that Griscom¹ has identified a series of 17 specimens from various points in Guatemala as *isthmica*.

This kingfisher is by far the most common member of the family in El Salvador, for it is generally distributed over the innumerable small streams of the foothill region—streams too small to be utilized by the larger species. Locally along the coast and on larger lakes it is less common than *Megaceryle torquata torquata* or, during the winter, than *Megaceryle alcyon alcyon*.

A favorite environment is along small, rocky streams of the uplands, and in such places the population averages about a pair to the mile. When the young of the year are on the wing, this average is considerably increased for a time. Probably the section of stream inhabited by any individual pair has pretty definite limits, for although individual birds or pairs show no hesitancy in keeping well ahead of a person for a time, sooner or later they will make every effort to break back along the route to the places from where they were first started. Salt water is apparently not greatly to their liking, and in the mangrove lagoons they were decidedly uncommon. Scarcity of suitable nesting sites may, however, be in part responsible for this condition.

Nesting.—Two holes, in front of which a pair of birds exhibited great anxiety, were found in a perpendicular bank of volcanic ash beside a stream at San Salvador February 28. Neither hole was more than a foot in depth, and one had a few scraps of soft inner bark in the nest cavity. Whether this was placed there by rough-winged swallows or the kingfishers is not known, but probably by the former. A juvenile just on the wing was taken March 23, 1912, at San Salvador and another, probably from the same brood, on April 10. At Lake Chanmico on June 5, 1912, two young were noted sitting side by side on a floating dead log and two more, of the same brood, on nearby twigs over the water. These were only just able

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 181, 1932.

to fly and were being fed by the parents. Another juvenile, which had not yet started the postjuvenile molt, was taken at Divisadero on September 24, 1925. On the data supplied by young birds the nesting season begins about the first week in February and lasts until well along in the summer.

Plumage notes.—The postjuvenile molt is a complete one, including all rectrices and remiges. The months in which it takes place must depend somewhat on the date of hatching. However, it is practically complete in two females taken September 27 and November 12, 1925, respectively. The annual molt of the adults takes place in the fall, but the definite time is not known. It has been completed for some weeks at least in specimens taken in January. There is a limited body molt in March and early April.

Colors of soft parts.—Adults: bill, dull black, touched with dark orange-brown at angle of gonys; tarsi and feet, dull, slaty black; iris, dark brown. Three-fourths-grown juvenile: bill, tarsi, and feet, dark brown; mandible extensively streaked with yellowish flesh-color; iris, dark brown.

Stomach contents.—Tiny fish and scales, 2.

Chloroceryle aenea stictoptera (Ridgway). MANGROVE KINGFISHER.

Ceryle superciliosa stictoptera Ridgway, Proc. Biol. Soc. Wash., 2, p. 95, 1885 [April 10, 1884]—Sisal, Yucatán, Mexico.

Specimens and records.—Puerto del Triunfo, 2; Barra de Santiago, 4; San Sebastián, 6; Río San Miguel, 1. Also noted at Lake Olomega.

Status.—Common resident of the mangrove belt coastwise. Also occurs, although less commonly, in swamp forest areas on the coastal plain.

Remarks.—These tiny kingfishers were numerous only along tidal channels bordered by mangroves. The few which were noticed away from salt water were found along shallow, boggy, slow-moving streams flowing through heavy forest where there was a fairly dense undergrowth of coyol palms. Ordinarily they are very tame and usually sit perfectly still until one has approached to close range. Very often the first indication of their presence is a clicking note, ridiculously thin and weak even for so small a bird, each click accompanied by a tail jerk violent enough to give a slight teetering motion. It is evident that these birds are extremely local, and they can seldom be driven more than a hundred yards from the place where they are first noticed. Pairs seem to be the rule throughout the year.

Nesting.—A juvenile, able to fly but not yet fully grown, was taken in the mangroves at San Sebastián July 20, 1912. The place was at least a mile from the nearest earth bank, in fact (at high tide) a mile from the nearest land of any sort. At this same date, adults in breeding condition were common throughout this same mangrove belt, but were never seen along the earth banks with *Megaceryle torquata torquata* and *Chloroceryle americana septentrionalis*. The question naturally arises as to whether this kingfisher so far departs from the bank-excavating custom of the family as sometimes to occupy natural cavities in trees.

Plumage notes.—The annual molt takes place in the fall, some time after the first of August. Late July adults are extremely worn, but show no beginnings of the molt, while those taken early in January are in fresh plumage. A young male was in postjuvinal molt January 16 and, on the basis of this one specimen, it appears that the plumage of maturity is assumed at this time.

Colors of soft parts.—Adults: bill, shiny black, flesh color at angle of gonyx and along inferior edge of mandibular rami; tarsi and feet, slate color; iris, dark brown.

Family MOMOTIDAE. Motmots

Momotus lessonii lessonii Lesson. LESSON'S MOTMOT. TOROVÓZ.

Momotus Lessonii Lesson, Rev. Zool., 5, p. 174, June, 1842—Realejo, Nicaragua.

Momotus lessoni Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 456, 1895—part, San Miguel; Forbes and Robinson, Bull. Liverpool Mus., 2, p. 18, 1900—"Between Guatemala and Sonsonate."

"*Momotus Lessonii* Less." Lafresnaye, Rev. Zool., 5, p. 130, April, 1842—San Carlos (=La Unión), prov. de San Salvador (nomen nudum).

Momotus lessonii lessonii Ridgway, U. S. Nat. Mus., Bull, 50, pt. 6, p. 457, 1914—San Miguel.

Specimens and records.—Mt. Cacagatique, 5; Volcán de Conchagua, 2; Colinas de Jucuarán, 1; Volcán de San Miguel, 1; Lake Olomega, 1; Los Esesmiles, 1; San José del Sacare, 1; Sonsonate, 2; Chilata, 1; San Salvador, 4. Also noted at Volcán de San Salvador; Volcán de Santa Ana. Recorded from San Miguel; La Unión.

Status.—Fairly common resident throughout the country between sea level and 5,000 feet, though decidedly less numerous below 1,000 feet and above 4,000. Although the species occurs in the Arid Lower Tropical and in both Arid and Humid Upper Tropical Zones, the mass of the population is found in the more elevated parts of the Arid Lower Tropical between 2,000 and 3,500 feet.

Remarks.—Although the species was first indicated by Lafresnaye in 1842 in the April number of the *Revue Zoologique*, with type locality designated as "San Carlos" [prov. de San Salvador], the lack of any description whatever made *Momotus lessonii* a nomen nudum until the June issue, when it was characterized by Lesson, and Realejo, Nicaragua was named as the type locality.

This species is far less common than *Eumomota superciliosa apiaster*. Its center of population is probably 1,500 or 2,000 feet higher, although practically the same extremes of elevation limit the distribution of both. There is also a decided average difference shown in the types of habitat, for *Momotus* shows a preference for deep forest and shaded ravines, while *Eumomota* is partial to more sunny, open woods and undergrowth.

On Mt. Cacaguatique Lesson's motmots were perhaps more common than in any other locality. Here they were found in pairs (the invariable rule throughout the year) in the ravines and in the dense oak forest, situations quite in keeping with their odd appearance and ghostlike, ventriloquial voice.

When curious or alarmed this motmot swings the tail rapidly from side to side or holds it rigidly at various angles from the vertical. The extreme angles are about "8 o'clock" and "4 o'clock." Ordinarily the tail hangs straight down. On Volcán de Conchagua one of these curious birds was seen on the ground, working through a carpet of dead leaves in company with a Swainson's wood-hewer. The motmot was not nearly so helpless as one might imagine, for with quick sidewise strokes of the bill it knocked the leaves aside very effectively. It could not be determined whether it hopped or walked, but at any rate it got through the leaves in a very efficient manner.

Motmots of all three species found in El Salvador are, to some extent, nocturnal. A juvenile (full grown) of the present species was found flying about in a ravine in the Colinas de Jucuarán fully an hour before daylight, and birds were often observed to be very active in the short interval between sundown and dark. Twice, birds were caught in mouse traps set in cavities in banks after dark and visited again before daylight. These cavities were not nest burrows, but simply short holes such as a skunk would dig when grubbing for worms.

Nesting.—Only two nests belonging with certainty to Lesson's motmot were discovered. The first was near the top of a six-foot stream bank at Chilata. The nature of the soil was very unlike that which *Eumomota* prefers, for it was almost pure leaf-mold mixed

with various-sized lava stones. The very crooked burrow, starting just under an overhang at the top of the bank, went straight in for about a foot and then zigzagged around stones for some two feet and a half more, culminating in a nest chamber nearly a foot in diameter and about six inches high. Due either to accident or design, the nest chamber was only about a foot from the entrance, and a slight amount of work would have permitted the sitting bird to escape in the event that the passage became permanently stopped up. The nest contained, on April 26, 1927, four, fresh eggs which were laid on the bare earth. The male, which was sitting at about 5 P.M., when the eggs were collected, made no effort to escape and had to be forcibly removed from the eggs. His belly showed a well-developed incubation patch on each side, even though the eggs were quite fresh. The second nest was found in the cloud forest on Volcán de Santa Ana, May 16, 1927. It was in a low, vertical bank caused by the fall of a large tree. The burrow went straight in for five feet at least, and then between two large lava blocks which were impossible to move. The frequent entrance of the parents pre-supposed young at this date. The four eggs in the set taken at Chilata are pure white, very slightly glossed and measure 34.5×28.1 ; 34.4×27.7 ; 34.0×28.5 ; 32.8×27.3 .

Plumage notes.—We have little to add to the conclusions reached by Beebe¹ in regard to the denudation of the central pair of rectrices. That author has shown that the stripping is not the result of the birds' efforts at adornment, but the natural consequence of inherent degeneration of the barbs at the point of juncture with the shaft. It is worthy of note that the denuded area in the juvenal feathers is very much less than in the subsequent stages, averaging only about twenty millimeters in length instead of forty to sixty as in the adults.

One specimen (No. 8221) is most interesting as further proof of Beebe's point that the tips of the shorter rectrices do not act as a "guide" for the bird in stripping the feathers. In this specimen, taken in March, the molt has been completed for some months, and the feathers have reached their maximum growth. The right central rectrix is, due to an abnormal cessation of growth, about thirty millimeters shorter than the left. On the left the stripping is normal; that is, the ends of the barbs reach just to the ends of the next pair of rectrices. On the right rectrix, however, although the stripped area is of much the same length as on the left one, the stripping

¹ *Zoologica*, 1, no. 5, pp. 141-149, January 15, 1910.

leaves the underlying rectrices exposed for a length of some thirty millimeters.

The weakness of the barbs along the line to be denuded is certainly the determining factor, for many of the barbs are so lightly attached that they come off at a touch, even though the feathers may still be partly encased in the blood sheaths. The ordinary abrasive action of preening is amply sufficient to remove them.

The annual molt commences in late July, but its duration is unknown. Specimens taken in mid-November have completed the molt for some time. The juvenal remiges and rectrices apparently are carried until fall as in *Eumomota*. This is certainly the case in several instances. There appears to be no spring molt.

Colors of soft parts.—Adults: bill, black; tarsi and feet, blackish brown; iris, dark red. Juveniles: similar to adults, but iris in male, orange-brown, in female, dusky pink. The color records for juveniles are of a single specimen of each sex, and the variation is more probably individual than sexual.

Stomach contents.—Insects, 1; berries and beetles, 1; berries, 1.

***Eumomota superciliosa apiaster* (Lesson). BLUE-BROWED
MOTMOT. TALAPO.**

Crypticus apiastur Lesson, Rev. Zool., 5, p. 174, June, 1842—San Carlos, Americae Centralis Oceani Pacifici (=La Unión, El Salvador); Actes Soc. Linn. Bordeaux, 12, no. 41, p. 193, September 15, 1842—San Carlos.

Eumomota superciliosa apiaster [sic] Griscom, Proc. New England Zool. Club, 11, p. 53, October 31, 1929—Salvador (crit.).

"*Crypticus fastuosus* Less." Lafresnaye, Rev. Zool., 5, p. 130, April, 1842—San Carlos, prov. de San Salvador (nomen nudum).

Eumomota supercilialis Sharpe (not *Prionites supercilialis* Jardine and Selby), Cat. Birds Brit. Mus., 16, p. 317, 1892—part, La Libertad, San Miguel; Salvin and Godman, Biol. Centr.-Am., Aves, 3, p. 464, 1895—part, La Libertad, San Miguel.

Eumomota superciliosa australis Ridgway (not *Eumomota supercilialis australis* Bangs), Bull. U. S. Nat. Mus., 50, pt. 6, p. 481, 1914—part, La Libertad? San Miguel? (footnote; crit.). Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 1, p. 110, 1918—part, Salvador.

Eumomota superciliosa bipartita Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, 1914, 480 ("La Libertad? San Miguel?").

Specimens and records.—Divisadero, 13; Chilata, 1; Rio San Miguel, 1; Rio Goascorán, 1; Volcán de San Miguel, 1; San Salvador, 6; Lake Olomega, 2; Mt. Cacaguatique, 1; Lake Guija, 1; Miraflores, 1; Sonsonate, 7. Also noted at Lake Chanmico; Volcán de San

Salvador; Puerto del Triunfo; Colima. Recorded from La Libertad; San Miguel; La Unión.

Status.—Common resident of wooded and semiwooded areas in the Arid Lower Tropical Zone. Although generally distributed, it is noticeably more common below 2,500 feet and reaches its extreme altitudes at 3,500 feet in the upper fingers of the Lower Tropical on Mt. Cacaguatique and on the partially cleared slopes of Volcán de San Salvador at 4,500 feet.

Remarks.—In company with others of Lesson's "San Carlos" species the present one has had a somewhat unsettled nomenclatural career. Lesson evidently transmitted to Lafresnaye the provisional name *Crypticus fastuosus* which was published in 1842 in the April number of the *Revue Zoologique*, giving the type locality as San Carlos, but with not a word of description; *fastuosus* is, therefore a *nomen nudum*. It is notable, however, that San Carlos is definitely stated to be in the "prov. de San Salvador." In the June issue, Lesson described the bird under the name *Crypticus apiaster*, but placed San Carlos no more definitely than "Americae Centralis, Oceani Pacifici." However, in September of the same year he again refers to "San Carlos, Salvador."

Ridgway and Bangs both recognized that there were at least two Central American forms, but the former thought that the name *apiaster* probably belonged to some southern race, and the latter believed "San Carlos, Central America" to be so indefinite as to be of no value whatsoever. Recently Griscom (sup. cit.) has revised the species and concludes that *australis*, *apiaster*, and *bipartita* are all recognizable, representing progressive steps in the Pacific coast series, from the pale *australis* in northwestern Costa Rica to the very much darker *bipartita* in western Guatemala and southern Mexico.

That *apiaster* extends a short distance over the Guatemalan border is a certainty, for a specimen collected at Lake Guija and not two miles from the Guatemala-El Salvador line is typical of *apiaster*. The specimens from Chilata, Sonsonate, and San Salvador are equally typical and show no tendency to vary in the direction of *bipartita*.

This species prefers thickets and undergrowth and is very seldom seen at any distance above the ground. Berry-bearing trees will often entice it to feed as high as thirty-five or forty feet, but the usual habitat and the one in which nine out of ten birds will be found is undergrowth beneath light-foliaged, open forest. Except during the breeding season solitary birds are the rule, although more rarely pairs will be found.

The curious habit of swinging the tail from side to side, either as a series of rapid twitchings, or as a slow movement, or even holding it rigid at the most ludicrous angles is as well developed in *Eumomota* as in *Momotus*. This movement has every appearance of being a symptom of alarm, anxiety, or curiosity. When a motmot becomes aware of one's presence, it will frequently "freeze." Sooner or later the tail, even though the body remains perfectly still, will be suddenly cocked sideways, to be held rigidly, or switched in a flash to a new angle. At such times the head is pulled well down, the bill pointed a few degrees above the horizontal, and the feathers of the body tightly compressed.

Nesting.—Road cuts, sliced perpendicularly through the soft, volcanic ash or pumice which covers so much of the country, provide, from the motmot's viewpoint, the most perfect of nesting sites. This is particularly true if the bank is partially concealed by hanging vines or other vegetation. It is noticeable that there are usually many more birds in regions crisscrossed by roads than there are in outlying regions where original conditions prevail to a great extent. The local rarity of this species in swampy regions during the breeding season is more probably because of the comparative or complete absence of proper situations in which to drill nest holes, than because of any lack of food. The case of the motmot, then, is in a sense comparable to that of the chimney swift in the north, since there has been a move toward settled districts, not for reasons of food, but because of more and better nesting sites.

Nest holes usually are placed near the tops of the banks, a position which gains the advantage of whatever overhang there may be, as well as of the screen of drooping shrubbery. The holes are about two inches in height by two and a half in width and run straight back for such distance as the hardness of the soil or the energy of the bird may determine. Two feet is about the minimum depth, and we excavated two holes to a point about six feet from the entrance with no nest chamber within reach. About halfway between these figures is probably the average. There seems invariably to be a sharp turn just before the nest chamber is reached. The chamber is simply a terminal enlargement of the tunnel and is about eight inches in diameter and four inches high.

Digging out motmot nests is discouraging work. Field equipment does not ordinarily include a pick and, therefore, it is usually necessary to mark a hole where a bird has been seen entering and to return at a later time with the proper implements. The chances

of finding the tunnel occupied are relatively poor, for the holes may remain for some years before erosion has completely wrecked them, and into these old holes birds are continually going, either in search of food, possibly, or to roost for the night, or for no apparent reason at all. The only way to be reasonably sure of securing eggs is to look for fresh earth sprinkled below the burrow and to excavate about ten days after the last dirt is thrown out. Even then the nest may have been deserted in the interim, or the set be incomplete, or the hole may be occupied by one of the carnivorous iguanas which has reached the opening only through complete defiance of all laws of gravity. The total results of excavating over a dozen favorable-looking burrows were a single egg and a complete set of four. No young were discovered in the nests, but the condition of two burrows from which they had only recently emerged disclosed that no excrement had been removed from the nest chambers, for the floors and walls were caked with it. No nesting material is used, the eggs being laid on loose earth on the floor of the chamber.

This species sometimes drills through the mud walls surrounding corrals or even walls of mud houses. At Zapotitán in July, 1912, a pair was seen drilling industriously at a two-foot-thick adobe wall in which there were already several other holes drilled clear through from side to side. The ranch manager said that the whole series had been drilled that year by the same pair of birds.

The earliest indications of nesting were noticed on March 27, 1926, when a bird was seen digging at a new burrow on Volcán de San Miguel. A laying female was taken at Lake Olomega on April 9, 1926. The height of the nesting season is the latter part of April, although birds were seen digging in early June at Miraflores and in early July at Zapotitán. A set of four fresh eggs taken at Chilata on April 27, 1927, are pure white and more highly glossed than those of *Momotus*. They measure 27.0×21.5 ; 28.0×22.5 ; 27.2×22.6 ; 26.9×22.2 . One of the parents was on the nest, but escaped after sitting tight while the nest was being dug out. From the incubation patches on both sexes during the breeding season it appears that brooding is equally divided. The parent on this nest gave evidence that the bold head and throat markings may be of real protective value, for, seen head on in the dim light of the burrow, the pattern was startlingly reptilian in appearance.

Plumage notes.—The denudation of the central rectrices reaches its extreme in this species. So loosely attached are the barbs that not infrequently some are dropped with the blood sheath. Others

may be blown off with a puff of breath, and the remainder are quickly removed in the normal course of preening. When a feather, is held up to the light, a partial degeneration of the barbs at their junction with the shaft, both proximally and distally from the denuded section, is plainly visible with the naked eye. Were this condition carried one step farther, the result would be a central pair of tail feathers stripped from the base to the black tip. It appears that the step preliminary to such a condition has already been accomplished. At present, the little black-edged notches on each web, about seventy-five millimeters from the bases of the feathers, mark the normal limit of stripping. There appears to be no sexual difference in the length of tail and size of racquets.

The postjuvenile molt occurs from the first part of July to the end of September, depending in part on the date at which the bird was hatched. It is doubtful if more than two months are consumed for any individual. When the young bird emerges from the nest burrow, the long, central tail feathers have just started to grow and seldom reach beyond the end of the other rectrices. The blue-bordered throat patch is the first part of the new plumage to be acquired. Following this the central rectrices complete their growth, and new feathers begin to appear on the pectoral region, flanks, and interscapular region. The remainder of the plumage is taken on very gradually with accent on no particular area. The abdominal region, face, and chin are the last parts to be affected. All of the juvenile rectrices and remiges are retained in their entirety until the next fall. The juvenile rectrices are to be recognized at any time during the year or more they are carried by the brownish slate coloration (those of the adults being almost uniform black), and the narrower, more rounded (less square-tipped) terminal spatulae on the central pair. The juvenile remiges are shorter and less firm, and the terminal areas of their secondaries are less purely black. Otherwise there seems to be no difference whatever between postjuvenile and adult plumages. All first-spring birds taken were in breeding condition.

The annual molt of the adult commences about mid-July with the molt of the first (inner) primary. The remainder of the primaries follow consecutively, but the wing molt is very slow and is not finished until some time after the body plumage has been completely renewed. The long central tail feathers and the outer primaries reach their full growth simultaneously and are the last feathers on the body to do so. There is no spring molt, so far as can be

determined by examination of several examples taken in February, March, and April.

Colors of soft parts.—Adults and young: bill, tarsi, and feet, black to blackish brown; iris, dark brown.

Stomach contents.—Grasshoppers and caterpillars, 1; insects, 10; berry seeds and insects, 4. At Puerto del Triunfo this motmot was often seen eating orange pulp from fruit which had originally been opened by *Centurus santacruzi*.

***Aspatha gularis* (Lafresnaye). BLUE-THROATED MOTMOT.**

Prionites gularis Lafresnaye, Rev. Zool., 3, p. 130, May, 1840—Guatemala.

Specimen collected.—Los Esesmiles, 1 (February 28, 1927).

Status.—Of rare occurrence (probably resident) in the cloud forest of the cordillera (pl. 22).

Remarks.—The only example obtained was collected in a densely wooded ravine at 8,000 feet. The circumstances of its capture were as follows: "The *Aspatha gularis* was shot just at dark in a very dense growth of tall oaks and white pines in the cloud forest. It was very active and I chased it about for some minutes. Fortunately it decoyed readily to an imitation of its call-note and kept coming back after my floundering about in fallen branches and undergrowth had frightened it away. The note was so exactly like the single hoot of a California pygmy owl that I was certain all the time of the bird being *Glaucidium gnoma*. Finally I caught a glimpse of its outline against the sky as it flew to a partially dead oak and heard it fall into dead leaves after I fired. Fifteen minutes of match lighting were necessary to find it. I waited some time in hopes of hearing its mate, but heard nothing. Later I returned to the spot with a jack-light, but with no better success." (Van Rossem's notebook, for February 28, 1927.)

Feathers of another individual were found in a nearby oak grove at the spot where a *Strix fulvescens* was shot, and it is probable that the owl was responsible.

The above notes show that this motmot is, at times, nocturnal, or at least crepuscular. Salvin and Godman¹ found it fairly common in the daytime in the oak forests on Volcán de Fuego, and mention that their Indian hunters often brought it in alive and uninjured. None was seen during the daytime on Los Esesmiles, although the vicinity of the capture of the single specimen was worked over on several other dates in hopes of finding another.

¹ Biol. Centr.-Am., Aves, 2, p. 470, 1895.

Colors of soft parts.—Adult male: iris, dark brown; maxilla, blackish horn with tomtia and terminal one-third of culmen, yellowish flesh; mandible, tarsi, feet, and claws, yellowish flesh-color.

Order PICIFORMES. Woodpeckers, Toucans, and Allies

Family BUCCONIDAE. Puff-birds

Notharchus hyperrhynchus cryptoleucus van Rossem.

EL SALVADOR PUFF-BIRD.

Notharchus hyperrhynchus cryptoleucus van Rossem, Trans. San Diego Soc. Nat. Hist., 8, no. 2, 3, Aug. 10, 1934—Barra de Santiago, Dept. of Ahuachapan, El Salvador.

Specimens collected.—Lake Olomega, 3; Puerto del Triunfo, 2; Rio San Miguel, 1; Barra de Santiago, 2.

Status.—Uncommon resident of swampy, forested areas in the lowlands through the entire length of the country. The species is apparently confined to the coastal plain, for the maximum elevation at which it was detected is 225 feet.

Remarks.—It was difficult to form any accurate estimate of the actual numbers of these puff-birds, for they are by nature so sedentary that only by accident does one as a rule notice them. Fully as many were located by ear as by eye, for the trill is characteristic and once heard cannot be confused with any other bird notes with which we are acquainted. It is a musical, rather "reedy" call, ridiculously thin and weak for so large a bird, and on first hearing it one looks for a small bunting.

This species, while ordinarily tame to the point of stupidity, was very much otherwise on one occasion, namely the first time it was met. In early August, 1925, Dr. Miller came across two puff-birds which were flying about, low to the ground, in the forest glades near Lake Olomega. These proved to be so wild that only after a long chase was he able to secure one. On the 26th, a thin, musical, sparrow-like trill was heard, apparently coming from the lower branches of an isolated tree growing on the top of a small knoll in a grassy clearing in the forest. A careful search was made, but for many minutes nothing was discovered. Just as the conclusion was reached that the trill must be made by some highly ventriloquial insect, the producer of it was suddenly seen in the dead branches of the treetop, where it had been sitting in plain view all the time.

On January 13, 1926, Morales came into camp at Puerto del Triunfo with the information that he had seen four "kingfishers"

sitting in the topmost branches of a tall leafless tree in the forest and at least half a mile from the nearest water. He led the way back to the place, and the "kingfishers" were immediately seen to be puff-birds. To do Morales justice they did look very much like kingfishers both in posture and profile. They were scattered at intervals on the topmost twig clusters where they sat perfectly still, except for occasional short swooping flights after insects, and paid no attention whatever to several shots fired at them. As they were at least 100 feet from the ground, it was more or less by luck that two were finally brought down. Several were seen and two specimens were taken during February, 1926, in an overflowed area of forest at Rio San Miguel, where they were hawking after small white moths. The flights were invariably short, and in the intervals they returned to their perches in dead or leafless trees. At Lake Olomega in April, 1926, and at Barra de Santiago in April, 1927, two specimens were taken at each place. They were all found about thirty feet from the ground in the comparatively open spaces above the undergrowth, but beneath the thickly foliaged crown of the forest.

Plumage notes.—An adult collected August 26, has practically completed the body molt. The tail molt is two-thirds completed, the order of replacement being as follows (counting the central pair as number 1): 2-5-4-3-1. The outermost pair (6) were as yet unshed. The primary replacement was two-thirds accomplished. The order of renewal is (counting from the inner primary distally): 2-3-4-5-1-10. The other four (6-7-8-9) were as yet unshed. Two birds of the year, collected January 13, show the postjuvenile molt to have included the entire plumage, except that one bird has retained number 4 rectrix on one side, number 6 primary on the left wing, and numbers 6 and 7 on the right. The other has retained number 4 primary on the left side and numbers 6 and 5 on the right. Another taken February 4, shows retention of the 7th and 8th primaries in each wing.

The spring molt is very extensive and involves most of the body plumage. What are probably one-year-old birds show irregular replacement of tertials, inner primaries, and rectrices. This molt occurs in March or early April.

The width of the pectoral band seems to be wholly individual and dependent on neither age nor sex.

Colors of soft parts.—Iris, dark red; bill, dull, slaty black; tarsi and feet, plumbeous slate.

Stomach contents.—Large insects, 1; sphinx moth, 1. Noted flying at small, white, day-flying moths.

Family RAMPHASTIDAE. Toucans

***Pteroglossus torquatus torquatus* (Gmelin). COLLARED ARACARI.**

Ramphastos torquatus Gmelin, Syst. Nat., 1, pt. 1, p. 354, 1788—"Venezuela" ("Central America," Cory, 1919).

Pteroglossus torquatus torquatus Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 342, 1914—Salvador.

Specimens and records.—Lake Olomega, 3; Puerto del Triunfo, 7; Zapotitán, 1; Volcán de Conchagua, 1; Rio San Miguel, 1; Chilata, 1. Also noted at San Sebastián. Recorded from "Salvador."

Status.—A fairly common, though rather local resident of the coastal plain and adjacent hill country. The center of abundance is in the lowlands, but locally the species ranges to the upper limits of the Arid Lower Tropical Zone.

Remarks.—Since *Ramphastos torquatus* Gmelin was based primarily on the *Tucana mexicana torquata* of Brisson it would seem preferable to have named a type locality in Mexico rather than "Central America," especially since it seems probable that the Central American population is capable of division into more than one race. Cory's designation may subsequently have to be changed.

The 14 El Salvador birds are typical of those occurring on the west coast from southern Mexico to western Costa Rica. The culmens of the males average about 100 mm., the black breast-spot is well developed, and there is a pronounced intermixture of black in the abdominal band.

This toucan habitually travels in small flocks of about half a dozen, and in most localities within its range two or three such troops may be encountered daily. They are very stupid birds and will often sit and squawk at a hunter even after several of the flock have been shot. At Puerto del Triunfo three were shot from a flock of seven, and the remainder refused to fly away, but barked and whistled and craned their necks foolishly at their fallen companions. They decoy readily, and the cries of a wounded or captive bird, particularly one of their own species, will bring to the trees overhead every toucan within earshot. The flight is peculiar. The head is outstretched, the tail well fanned out, and the wing beats quite rapid. Long flights are seldom made, the flight usually being from one treetop to the next.

Nesting.—Three young birds were seen on the wing, although still following their parents, at Zapotitán on July 25, 1912. A male taken at Lake Olomega on August 26, 1925, was in full breeding condition. Birds taken in January, February, and April were dormant sexually.

Plumage notes.—The annual molt commences very early (as early as June 11 in one specimen). The order of primary replacement is, normally, progressive, commencing with the innermost. The secondary molt commences with the innermost "tertial" and the distal secondary, and the molt progresses from these two points to a common center. The tail molt commences with the third or fourth pair from the outside and progresses outwardly. The central pair usually are not shed until the other rectrices are nearly, sometimes fully, grown. The postjuvenile molt is a complete one so far as the body plumage is concerned, but the juvenile remiges and rectrices are retained. In midwinter and early spring (January and February) a varying number of the juvenile rectrices are replaced, as are some of the inner secondaries (tertials) and scattered portions of the body plumage. The spring molt of the adult is much less extensive, but usually includes one or two outer pairs of rectrices as well as a small number of body feathers, mainly anterior to the interscapular region.

Colors of soft parts.—Adults: iris, bright yellow, shaded with dark green on anterior and posterior sides of pupil, thus giving the effect of a horizontally oval or even oblong pupil; tarsi and feet, greenish horn-color; bare circumorbital skin, dark chocolate anteriorly, shading behind eye into dark red above auriculars.

***Aulacorhynchus prasinus stenorhabdus* Dickey and van Rossem.** GUATEMALA GREEN TOUCAN.

Aulacorhynchus prasinus stenorhabdus Dickey and van Rossem, *Ibis*, p. 52, January, 1930—Cerro Los Naranjos, Volcán de Santa Ana, Dept. Sonsonate, El Salvador; *ibid.*—Volcán de San Salvador, Los Esesmiles, Mt. Cacaguatique; Griscom, *Bull. Amer. Mus. Nat. Hist.*, 64, p. 221, 1932—Salvador.

Specimens collected.—Volcán de Santa Ana, 3; Volcán de San Salvador, 1; Los Esesmiles, 4; Mt. Cacaguatique, 2.

Status.—Rather rare resident of the cloud forest association in the cordillera and on the coastal range east to Volcán de San Salvador. The vertical range is from 3,500 to 8,000 feet.

Remarks.—The Guatemalan form of the green toucan reaches its southern limit in El Salvador. Coastwise it comes to an abrupt stop on Volcán de San Salvador, and even at this point shows no tendency toward intergradation with *A. p. volcanius* of Volcán de San Miguel. On the other hand, the specimens from Los Esesmites and Mt. Cacagatique (interior) are variously intermediate toward *A. p. virescens*, with which it doubtless blends gradually in the Honduran highlands.

This race is nowhere in El Salvador to be classed as common, as the evidence of a total of ten birds collected in approximately three months spent in suitable localities can testify. On Volcán de Santa Ana on May 6, 1927, two groups of four birds each were met in the cloud forest on the steep slopes of the spur cone of Cerro de Los Naranjos. Circumstances were such that it was not possible to collect more than one of these birds, a one-year-old male. The second group was seen flying as a unit across a small ravine. One of these parties was encountered again on May 13 in the identical location where first found and this time a one-year-old female was collected. Again, on May 16, the remaining pair was located close by the original location and an adult male taken. Of course, there is no certainty that it was always the same group which was encountered in the same location, but the probabilities are that such was the case. Other green toucans were heard calling from various parts of the mountain, but were never seen. On Volcán de San Salvador in early June, 1912, only two single birds were found during a week's stay. Both were in the crown foliage of the dense forest and a good hundred feet from the ground. During February, 1927, several pairs were noted in the cloud forest on Los Esesmites. On Mt. Cacagatique only three birds were found in the five weeks spent there in late November and December, 1925. On November 24, a pair was found in a banana grove in a ravine at 3,500 feet, and a single bird was seen in the oaks at 4,000 feet.

The green plumage of these toucans renders them almost invisible at times. Even when it may be known that one is present in a certain tree, it is often very difficult to find unless a sudden movement of the bird's head draws attention to the bright yellow maxilla, the most betraying marking possessed by the species.

Plumage notes.—The juvenile remiges and rectrices are carried until the birds go through the first annual molt. The rectrices are narrower, as a rule sharply pointed, and the central pair almost invariably lack the chestnut-tipping of the adult feathers. The

annual molt starts very early. It is well under way in a pair of one-year-old birds taken May 6 and 13, respectively, and has just started in an adult male taken May 16. Another adult taken June 6 has not even started the molt, while a pair of adults taken November 24 are just finishing it. The evidence of specimens at hand indicates that one-year-old birds molt considerably earlier than adults. Birds in fresh plumage are brighter and more yellowish green than worn ones. Because of the laxness of the plumage, wear is rapid, and by early spring the underparts are beginning to show the bluer tints of the basal portions of the feathers.

Colors of soft parts.—Adults: iris, varying from brownish red to dark brown; bare skin about eye, brownish slate; tarsi and feet, varying from slaty green to slaty blue.

***Aulacorhynchus prasinus volcanius* Dickey and van Rossem.**
SAN MIGUEL GREEN TOUCAN.

Aulacorhynchus prasinus volcanius Dickey and van Rossem, Ibis, p. 53, January, 1930—Volcán de San Miguel, Dept. San Miguel, El Salvador.

Aulacorhamphus prasinus Salvin and Godman (not *Pteroglossus prasinus* Gould), Biol. Centr.-Am., Aves, 2, p. 559, 1896—part, Volcán de San Miguel.

Aulacorhynchus prasinus prasinus Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 355, 1914—part, Volcán de San Miguel.

Specimens collected.—Volcán de San Miguel, 14 (March 12 to 26, 1926).

Status.—Common resident of the oak groves of the Arid Upper Tropical Zone on Volcán de San Miguel, straggling occasionally into the edge of the deciduous forest of the Arid Lower Tropical. The vertical range is from 2,500 to at least 4,000 feet.

Remarks.—This isolated race may be distinguished from *stenorhabdus* by shorter wing and tail, relatively and actually longer bill, paler body coloration and russet, instead of chestnut, tail spots and crissum.

The green toucans inhabiting Volcán de San Miguel are so much more numerous than is the case with this species anywhere else in El Salvador that one is inclined to believe that the population has nearly, if not quite, reached the saturation point. Throughout the oak groves growing between 2,700 and 4,000 feet on the south slope and down into the woods in the upper limits of the Arid Lower Tropical, these birds were noted to the number of a score or more every day between March 12 and 26, 1926. It was evident that the

nesting season was fast approaching, for the ova of the females were enlarged (3 to 5 mm. in diameter) and the males were in full breeding condition. In spite of this, flocks of four or six were the rule. Evidently the break-up into isolated pairs does not take place until egg-laying has actually commenced.

Nesting.—The condition of the females taken indicates that laying starts about the first week in April. It is of interest to note that one-year-old birds were preparing to breed.

Colors of soft parts.—As in *A. p. stenorhabdus*.

Family PICIDAE. Woodpeckers

Colaptes mexicanoides pinicolus Dickey and van Rossem. EL SALVADOR FLICKER, CARPINTERO (all woodpeckers).

Colaptes mexicanoides pinicolus Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 131, June 29, 1928—Los Esesmiles, Dept. Chalatenango, El Salvador; *ibid.*—San José del Sacare.

Specimens and records.—Los Esesmiles, 13; San José del Sacare, 2. Also noted at La Palma.

Status.—Common in February and March, and probably a permanent resident, in the pine and oak belt on the south slope of the cordillera in Department Chalatenango. While almost entirely a resident of the Arid Upper Tropical Zone, the species straggles into more open areas of the cloud forest in the Humid Upper Tropical. The vertical range is from 2,400 to 8,000 feet.

Remarks.—Although Lafresnaye's type of *Colaptes mexicanoides* in all probability came from Guatemala and not from "Mexico," the flickers of Chiapas are so similar to Guatemalan birds that there is no doubt that all should be included under one name. In size, Guatemalan and Chiapas birds are larger than the El Salvador race, particularly in length of bill. In color, Guatemalan specimens, while normally like those from Chiapas, occasionally are intermediate toward the paler-colored southern form.

While common in the pine-oak regions of Chalatenango, flickers appeared to be entirely absent from similar associations at the more southeasterly point of Mt. Cacaguatique. The causes for absence from the latter place are not apparent, but it was pretty certain that season played no part. This was one of the species particularly sought on Mt. Cacaguatique in November and December, 1925, and the fact that not even a single old nest hole which could have belonged to flickers was discovered argues against summer residence in the locality.

There appears to be little or no difference, in the ecological niche occupied, between these El Salvador flickers and their northern congeners. In call-notes, habits, choice of nesting sites, and appearance in life, they are scarcely, if at all, to be distinguished from *Colaptes cafer*.

Nesting.—By February 1 the flickers were mostly in pairs and had started excavating new nesting holes or cleaning out old ones. The usual site selected was a tall dead pine, although some holes were seen in old, half-rotten oak stubs. In height the nests ranged from ten feet to about fifty feet. Egg-laying probably starts the first week in March on the average, although a female taken on February 23 was laying even at that early date.

Colors of soft parts.—Iris, dark red to dark, reddish brown; bill, dull brownish black or slaty black; tarsi and feet, bluish plumbeous.

***Ceophloeus lineatus similis* (Lesson). WHITE-BILLED PILEATED WOODPECKER.**

Picus similis Lesson, Compl. Oeuvr. Buffon, 20, p. 204, April, 1847—"San Carlos, république du Centre-Amérique" (=La Unión, El Salvador).

Ceophloeus lineatus similis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 150, 1914—"San Carlos," La Libertad; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 2, p. 458, 1919—Salvador.

Ceophloeus scapularis Salvin and Godman (not *Picus scapularis* Vigors), Biol. Centr.-Am., Aves, 2, p. 450, 1895—part, La Libertad.

Specimens and records.—Lake Olomega, 9; Rio San Miguel, 2; Rio Goascorán, 2; Puerto del Triunfo, 1; Mt. Cacaguatique, 4; Lake Chanmico, 2; San José del Sacare, 1; Sonsonate, 1. Also noted at Volcán de San Miguel; Chilata; Barra de Santiago; Colima; Zapotitán; Lake Guija. Recorded from La Unión; La Libertad.

Status.—Common resident in timbered regions throughout the Arid Lower Tropical Zone. It extends locally into the oaks and pines at the lower edge of the Arid Upper Tropical as high as 3,600 feet, but the center of abundance is the coastal plain and lower foothills.

Remarks.—These woodpeckers are generally distributed wherever enough large timber remains to provide suitable cover. They cannot be called abundant, but perhaps the statement that they are about as numerous as are flickers in especially good localities in the United States will convey an approximate idea of their numbers.

The native method of clearing woodland for corn results in extremely favorable, although temporary, local conditions. The

trees are simply girdled and, after two or three years, the fallen carpet of dead leaves, fallen branches, and grubbed-up underbrush is fired. The larger trees often remain standing, charred around their bases, but providing for several years to come a living for myriads of borers which, in turn, provide bountiful provender for woodpeckers, particularly the larger species. There is little doubt that such conditions cause local fluctuations in the numbers of these birds from year to year. In the normal habitat each pair of pileated woodpeckers has some tall dead forest tree for a center, which not only serves as a lookout, but also as a base from which to range through the adjacent woods.

Pairs stay together at all seasons of the year, and groups of four, five, and six were encountered often enough to lead to the conviction that families sometimes remain in company for a long while after the young are able to fare for themselves. This was almost certainly the case when three members of a group of four were collected (in December), and all of them were found to be marked in varying degree with the same type of aberrant plumage characters.

Like the similarly colored, but still larger *Phloeoceastes guatemalensis*, these woodpeckers are more or less fearless, in strange contrast to the wildness of the large woodpeckers of the north. If one member of a pair or group is shot, those which remain often fly down to investigate, and pay little or no attention to anything except the fallen bird.

Nesting.—A juvenile only recently from the nest was collected February 18, 1926, at Rio San Miguel. Another taken at Lake Channico May 22, 1912 had nearly finished the postjuvenal molt. Apparently this species is a midwinter breeder.

Plumage notes.—The annual molt commences very early and progresses slowly. Its completion requires fully three months. The earliest evidences are shown in a female taken June 6, which has already replaced the three inner primaries and the two innermost tertials, besides a number of lesser and middle coverts and interscapulars. The body and tail molt is complete by about August 1, at which time (several specimens) the distally progressive primary molt has progressed to the sixth or seventh primary. The specimens taken September 1 have the ninth still in sheath, with the old tenth still unshed. October, November, and December specimens are in fresh plumage with no signs of feather replacement anywhere. A male taken January 9 shows a limited interscapular and pectoral

molt, something in the nature of a prenuptial, for nesting takes place about that date. The postjuvenile molt appears to take even more time than does the adult annual. A young bird just out of the nest on February 18 has already replaced the abbreviated inner primaries, but is otherwise in pure juvenal plumage. Another taken May 22 has completed the body and tail molt, but the wing molt has reached only the sixth primary; one taken August 13 still retains the two, old, outer primaries, while one taken October 29 has just shed the outermost primary. It is probable that these last two birds represent late broods.

The postjuvenile wing quills are usually conspicuously tipped with pale buff, a condition which is sometimes seen in obsolete form in adults. The short covert to the outer primary also appears always to be edged with buff in the postjuveniles, but otherwise there seem to be few or no differences between adult and postjuveniles. It may be remarked that the outer primary in this species is not shorter in the adults than in the juveniles other than as an average character.

An interesting case of plumage variation which was, in part at least, transmissible to the young, is shown by an adult female and two young of the year taken together on December 2, 1925, on Mt. Cacaguatique. The adult female is rather prominently barred with pale gray on wing coverts, several secondaries, interscapular region, back, rump, and lateral rectrices. The young male is similarly marked, but to a notably lesser degree, while the young female is only slightly abnormal.

Colors of soft parts.—Juvenile; bill, bluish horn-color, tip paler; tarsi and feet, lead-blue; iris, dark brown. Adults: bill, ivory-white, becoming bluish at base of maxilla and on basal third of mandible; iris, bluish white to ivory-white; tarsi and feet, bluish horn-color.

Stomach contents.—Ants, 1; miscellaneous small beetles and other insects, 2.

Centurus aurifrons santacruzi Bonaparte. VELÁSQUEZ WOOD-PECKER. CHEHE. CHEHE CARPINTERO.

Centurus santacruzi Bonaparte, Proc. Zool. Soc. Lond., p. 116, 1837—(Santa Cruz de Quiche) Guatemala.

Melanerpes aurifrons subsp. n. *Melanerpes santacruzi* Hargitt, Cat. Birds Brit. Mus., 18, p. 179, 1890—part, San Salvador.

Melanerpes santacruzi Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 420, 1895—part, La Libertad, Volcán de San Miguel.

Centurus santacruz santacruzi Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 85, 1914 (cit. of above); Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 2, p. 424, 1919—Salvador.

Centurus santacruzi pauper Ridgway (not of Ridgway, page 582), Proc. U. S. Nat. Mus., 10, p. 583, 1887 (1888)—in text, Salvador? (crit.).

Specimens and records.—Lake Olomega, 5; Rio Goascorán, 1; Rio San Miguel, 1; Mt. Cacagatique, 4; Sonsonate, 2; San Salvador, 4; Chilata, 1; Lake Chanmico, 1; Lake Guija, 1; Volcán de San Miguel, 1; Volcán de Conchagua, 1; Divisadero, 2; Puerto del Triunfo, 1. Also noted at Volcán de San Salvador; Ciudad Barrios; Colima; La Palma; San José del Sacare. Recorded from Volcán de San Miguel; La Libertad; "Salvador."

Status.—Common and generally distributed resident of all types of woodland in the Arid Lower Tropical Zone and locally in the Arid Upper Tropical to about 4,500 feet.

Remarks.—The series of twenty-five specimens shows extraordinary variation in color. The white barring on the backs varies from one millimeter in width, with black interspaces of three millimeters, to equal black and white bars about one and one-half millimeter wide; the nasal tufts range from dirty white to orange-yellow; the abdominal region is golden yellow, yellow-ochre, brownish orange or orange-red; and the underparts vary from grayish "avel-laneous" to "buffy brown." While season plays some part in the relative darkness of the underparts (worn specimens being paler than fresh ones), still, some of the most worn and abraded individuals are very much darker than some in new fall plumage. This variation appears to be largely, if not entirely, individual. Although there is possibly a tendency toward a preponderance of dark birds west of the Lempa and throughout the highlands, the extremes may be found in the same localities both east and west. In size, El Salvador birds are almost as variable as they are in color, but seem to show no tendency toward *pauper* of the Atlantic slope. Measurements of the ten males are as follows: wing, 129–141 (134.4); tail, 71–77.5 (75.3).

This very common woodpecker, the most numerous representative of the family in the republic, is especially abundant in the lower coffee district, along hedgerows dividing cultivated fields, and about the many small farms of the lower hill country. It is well known to all residents of the country, by whom it is justly blamed for much damage to fruit and berries. In most of its habits, it much resembles the common red-bellied and Gila woodpeckers of

the north. During the early spring months it is especially noisy and active, the courtship antics including a great deal of bobbing and bowing. The native name "Chehe" (pronounced Cháy-hay) is a fairly good rendition of the commonest call-note.

Nesting.—Nest holes are drilled in either live or dead branches, one that is upright, or nearly upright and less than a foot in diameter usually being chosen. Nest holes varied from three feet from the ground to about twenty-five feet, but on the average were perhaps twelve or fifteen feet up. It is obvious that locations close to the ground are preferred, and very often a line of fence posts running through a patch of woods will be riddled with new and old nest holes even though higher and seemingly safer sites are available. New holes are probably drilled each season, for ferruginous pygmy owls are likely to pre-empt old ones, particularly those highest from the ground. Possibly the propensity of the owls for appropriating the higher sites is the chief reason why *santacruzi* so often selects situations close to the ground.

Laying commences about the middle of March. A nest found on Volcán de San Miguel March 23, 1926 held three eggs in which incubation had just commenced. The male was on the nest at about 5 P.M. and was shot as he left the hole. It was evident from his condition that he had been doing at least his share of the incubating. Another nest chopped out at San Salvador April 10, 1912, held five eggs, four of which contained well-formed embryos. A third, at Lake Olomega, held three eggs nearly ready to hatch on April 12, 1926. Five eggs measure 25×19.2 ; 25×19.1 ; 24.3×19.5 ; 25.2×18.6 ; 25.1×18.7 . Fresh eggs have very little gloss, but after a few days' incubation they become as highly polished as the eggs of more familiar species. In spite of the constancy in measurements there is considerable variation in shape, even among eggs of the same set. Some are nearly equiended and resemble small doves' eggs; others are sharply pointed, not unlike those of shore birds.

Plumage notes.—The annual molt commences about the middle of July and is completed by the first week in September. The primary molt progresses distally, beginning with the innermost. In the tail, the intermediate pairs are dropped first, the outer ones next, and the central pairs last of all. The outer primaries and the central rectrices are the last feathers on the body to be replaced. The postjuvénal molt apparently follows much the same sequence as that of the adults, but probably varies somewhat, depending on the date of hatching. Two young birds taken July 24 and

September 24 probably represent, respectively, the first and second broods of the season. Both are about half way through the post-juvenal molt.

Colors of soft parts.—Adults: iris, reddish brown, brownish red, or dark red; bill, blackish slate; tarsi and feet, greenish horn-color. Juveniles: similar, but iris brown.

Stomach contents.—Seeds and fruit pulp, 1; insects, 3; larvae of wood borers and grass seeds (!), 1. This woodpecker is a fruit-eater at all times of the year and was observed to eat many varieties of wild and domestic fruit and berries. It often causes considerable damage by drilling holes into oranges, seldom taking more than a few bites of the pulp, and drilling fresh fruit on the next visit. Most of the oranges in a small group of trees in the village of Puerto del Triunfo had been spoiled thus. Many other species of birds directly benefit by this procedure, for the openings in the tough skin, made originally by the woodpeckers, afford them easy access to the pulp.

***Picus rubiginosus yucatanensis* (Cabot). CENTRAL AMERICAN GREEN WOODPECKER.**

Picus yucatanensis Cabot, Proc. Bost. Soc. Nat. Hist., 1, p. 164, May, 1844—Yucatan.

Chloronerpes rubiginosus yucatanensis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 181, 1914—La Libertad, Volcán de San Miguel; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 2, p. 439, 1919—part, Salvador.

Chloronerpes yucatanensis Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 407, 1895—part, La Libertad, Volcán de San Miguel.

Specimens and records.—Lake Olomega, 8; Lake Ilopango, 2; Chilata, 1; San Salvador, 1; Lake Chanmico, 1; Volcán de San Miguel, 1; Mt. Cacaguatique, 5; Volcán de Conchagua, 1; Volcán de Santa Ana, 1; San José del Sacare, 1. Also noted at Puerto del Triunfo; Colima. Recorded from Volcán de San Miguel; La Libertad.

Status.—Of fairly common and even distribution through the Arid Lower Tropical and both Arid and Humid Upper Tropical Zones from sea level to at least 5,000 feet.

Remarks.—We are unable to make out any deviation of the El Salvador series from typical *yucatanensis*. In 1927 we compared our birds very carefully with all material in the United States National Museum and Biological Survey and came to the conclusion that, while there was a good deal of individual and seasonal variation present, El Salvador birds showed no tangible geographic differences.

In view of Griscom's suggestion¹ that his recently described races, *P. r. maximus* of the Pacific highlands of Guatemala and *P. r. differens* of the Pacific lowlands of the same country, might be found in adjacent portions of El Salvador, we have gone over the question again with the characters of his new races in mind. We are unable to alter our initial opinion, namely, that El Salvador birds are not distinguishable from *yucatanensis*. However, since several others subspecies of El Salvador birds present analogous distributions, the present case is not surprising. It is noteworthy chiefly because it provides additional evidence of the north coast origin of a part of the Salvadorean avifauna.

This is by no means a common woodpecker, though zonally it has a wide distribution. In habits it differs considerably from *Centurus santacruzi* for it is solitary, except during the breeding season. In this respect as well as in choice of low growth it is strongly suggestive of *Sphyrapicus*. The green plumage is not nearly so noticeable as one would imagine; in fact, all in all, this is a rather inconspicuous species. By far the most prominent feature, when in flight, is the yellow wing-lining, which is displayed very plainly and makes an excellent field mark. The call-note is so much like the "yerk-yerk-yerk" of a flicker as sometimes to cause uncertainty as to identity. On Mt. Cacagatique the flicker-like calls of green woodpeckers were the cause of repeated disappointments, for flickers were objects of especial search there and, though none were found, each green woodpecker's call had to be investigated.

Nesting.—A young female, just commencing the postjuvenile molt on April 26, is indicative of an extremely early nesting, but breeding normally takes place at about the same time as with *santacruzi*, for pairs are not much in evidence until after the first of March. At Lake Olomega during the month of August several family parties were seen in the woods, the young already well along with the postjuvenile molt.

Plumage notes.—The annual molt begins early in July. Several specimens taken in August show that the sequence is very similar to that of *santacruzi*, even to the casting of the intermediate rectrices first and the retention of the central and outer pairs until a little later. As with that species, the central pair is the last to be shed, being dropped about the time the outermost primaries are being replaced. No evidence of a spring molt is to be observed in birds taken in March and April.

¹ Amer. Mus. Novit., 379, pp. 11-12, October 17, 1929.

Colors of soft parts.—Adults: iris, dark brown; tarsi and feet, lead-blue; bill, blackish brown.

Stomach contents.—"Insects," 3. This woodpecker seems to feed exclusively upon insects, and it was never seen about fruit or berry trees. The method of feeding is to work slowly up a trunk, tapping gently and prying into bark crevices.

***Balanosphyra formicivora lineata* Dickey and van Rossem.**

EL SALVADOR ACORN WOODPECKER.

Balanosphyra formicivora lineata Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 1, January 8, 1927—Mt. Cacaguatique, Dept. San Miguel, El Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 224, 1932—El Salvador (crit.).

Specimens collected.—Mt. Cacaguatique, 20; Los Esesmiles, 4; San José del Sacare, 1.

Status.—Common resident of the oak-pine association of the Arid Upper Tropical Zone along the cordillera, occasionally extending into the edges of the Humid Upper Tropical cloud forest. Extremes of elevation at which the species was found are 3,000 and 8,500 feet.

Remarks.—At the time the writers described *lineata*, mention was made of *striatipectus*, "of the Atlantic slope of Nicaragua and Honduras," purely on the assumption that *striatipectus* was the form present in those regions. Since that time we have examined a small series from the Matagalpa region of Nicaragua in the American Museum of Natural History, and find them to be referable to *lineata*. Los Esesmiles lies on the Honduran border, and there is every reason to suppose that the same form will be found throughout the highlands of southwestern Honduras. In the museum at San Salvador there is a specimen which, according to Dr. Calderón, came from somewhere near Ocotepeque in south-central Honduras.

On Mt. Cacaguatique in November and December, 1926, these woodpeckers were extremely common all through the oak and pine groves. They were in small groups of from two to six, which were probably family parties, for some of the birds taken from such assemblages were still partly in juvenal plumage. In early spring, in February on Los Esesmiles and in March at San José del Sacare, single birds and pairs were much in evidence, and the winter groups had evidently broken up as the breeding season drew near.

There are several noteworthy differences in habits between *lineata* and their northern relatives *B. f. bairdi* of California and *B. f. formicivora* of Arizona. On the whole, *lineata* is less active and

very seldom was seen to make the flycatching flights so often observed in the other two forms. No evidence was found that El Salvador birds store or in any way make use of acorns, although there were plenty of acorns and plenty of dead stubs in which to store them. The call-note is much weaker than that of the two United States races and was seldom heard even in localities where the birds were common.

Although common in the pines and oaks on Los Eses miles right up to the limit of the Arid Upper Tropical Zone, only a few individuals were found in the cloud forest. Occasional birds penetrated into the latter environment for short distances where they were seen in dead-topped trees, but such occurrences were sporadic, and there was little straying from the warm, sunny, southern exposures.

Oaks and pines are to be found on several mountains along the coastal chain, but none of these woodpeckers were ever seen there. Carriker¹ has noted a somewhat analogous case of distribution in Costa Rica.

Plumage notes.—By November 25, the earliest fall date on which specimens were collected, adults had entirely finished the annual molt. Young of the year had likewise completed the molt, but in several, some juvenal feathers still persisted in the crown and lesser wing coverts. There is a limited spring molt, evident in specimens taken in February and March, which seems confined to the pectoral region.

Colors of soft parts.—Adults: iris, ivory-white; bill, black; tarsi and feet, bluish horn-color. Juveniles: similar, but iris bluish white and base of mandible, light brown. The color of the iris changes slowly, and even into the first winter retains a slightly bluish tinge. It is thus a good mark of immaturity in winter birds, for only when fully adult is the creamy or ivory tint attained.

Stomach contents.—Mistletoe berries form the bulk of the food whenever they are to be obtained, but a good many small beetles, winged insects, and larvae, probably of wood borers, were also found in stomachs examined. As noted above, acorns are not stored or used in any way.

***Sphyrapicus varius varius* (Linnaeus). YELLOW-BELLIED
SAPSUCKER.**

Picus varius Linnaeus, Syst. Nat., ed. 12, 1, p. 176, 1766—South Carolina.

¹ Ann. Carnegie Mus., 6, p. 585, 1910.

Specimens collected.—Mt. Cacagatique, 5 (November 23, 30, December 10, 18, 19, 1925); Los Esesmls, 1 (February 12, 1927).

Status.—Fairly common midwinter visitant in the cordillera and adjacent lowlands.

Remarks.—The yellow-bellied sapsucker seems to be generally distributed in midwinter all along the interior mountains. No signs of its workings were found anywhere along the coastal chain, and by negative evidence the species does not occur there. Borings which could have been made only by this species were noted on the trunks of roadside trees at an elevation of only 800 feet at the southeastern base of Mt. Cacagatique. However, no birds actually were taken or seen below 3,500 feet.

**Veniliornis fumigatus¹ sanguinolentus (Sclater). CABOT'S
WOODPECKER.**

Chloronerpes sanguinolentus Slater, Proc. Zool. Soc. Lond., p. 60, pl. 151, May, 1859—Omoa, Honduras.

Specimens collected.—Lake Olomega, 3; Puerto del Triunfo, 4; Hacienda Miraflores, 2; Hacienda Zapotitán, 3.

Status.—Uncommon resident of heavily forested areas on the coastal plain.

Remarks.—El Salvador specimens appear not to differ in color from typical examples from the Atlantic slope of Honduras, except that not one of the twelve birds shows the slightest trace of red anywhere on the interscapular region. They average slightly smaller than normal, the dimensions of the six males being as follows: wing, 80–86 (83.6); tail, 43–48.5 (45); culmen from base, 20.2–22.5 (21.4).

The forests of the lowlands are the natural habitat of these little brown woodpeckers and, whether because of aversion to civilization or because they require primeval conditions, the fact remains that none was found in the vicinity of towns or villages. In habits and call-notes *sanguinolentus* resembles very much the smaller species of *Dryobates*, to which it is closely related and in which genus it could, we believe, be included.

Plumage notes.—The annual molt starts rather early, for in a specimen taken as early as June 20 the wing molt had progressed as far as the fourth primary, although there were very few new body feathers apparent at this date. A juvenile taken June 7 has just commenced the postjuvinal molt.

¹For the change in the specific name from *oleagineus* to *fumigatus*, see Zimmer, Field Mus. Nat. Hist., Zool. Ser., 17, No. 7, p. 310, 1930.

Colors of soft parts.—Adult: iris, dark, brownish red; tarsi and feet, plumbeous blue; bill, blackish plumbeous.

Dryobates villosus parvulus Dickey and van Rossem.

EL SALVADOR HAIRY WOODPECKER.

Dryobates villosus parvulus Dickey and van Rossem, Proc. Biol. Soc. Wash., 42, p. 219, December 14, 1929—Los Esesmites, Chalatenango, El Salvador.

Specimens collected.—Los Esesmites, 5 (February 15 to March 2, 1927).

Status.—Uncommon inhabitant of the cloud forest of the Humid Upper Tropical Zone. The vertical range is from 8,000 to 9,000 feet.

Remarks.—The only area in El Salvador which is suitable for this species is the cloud forest on Los Esesmites. Here it was occasionally found during February and early March, 1927, invariably in pairs and preferring the more open parts of the woods. Not more than a dozen individuals were noted during six weeks of work in that locality. A locality favored by hairy woodpeckers was an old clearing of some fifty acres, grown with a ten-foot-high scrub in which the tall, dead trunks of the former forest stood at closely spaced intervals.

Colors of soft parts.—Adults: bill, tarsi, and feet, dark, greenish horn-color.

Phloeocastes guatemalensis guatemalensis (Hartlaub).

GUATEMALA IVORY-BILLED WOODPECKER.

Picus guatemalensis Hartlaub, Rev. Zool., 7, p. 214, 1844—Guatemala.

Campophilus guatemalensis Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 446, 1895—part, Volcán de San Miguel.

Scapanus guatemalensis guatemalensis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 6, p. 174, 1914—"San Carlos," San Salvador, Volcán de San Miguel; Cory, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 2, no. 2, p. 465, 1919—"Salvador."

Picus lessonii Lesson, L'Echo du Monde Sav., 11 ann., no. 52, col. 921 of vol. for 1844, January 5, 1845—"San Carlos" (=La Unión).

Specimens and records.—Lake Olomega, 8; Mt. Cacaguatique, 1; Rio San Miguel, 1; Volcán de San Miguel, 1; Hacienda Zapotitán, 1; Puerto del Triunfo, 1. Also noted at Volcán de Conchagua; Chilata; San José del Sacare. Recorded from La Unión; San Salvador; Volcán de San Miguel.

Status.—Uncommon resident of large timber throughout the Arid Lower Tropical Zone and lower parts of the oak-pine association

in the Arid Upper Tropical. The vertical range is from sea level to 4,000 feet.

Remarks.—While we agree with Ridgway that there is little or no size difference by which to distinguish *Scapanus guatemalensis buxans* of Panama and Costa Rica, still the yellowish or buffy suffusion over the whole ventral surface is so characteristic of the southern race that we accept it as valid without hesitation. Typical *guatemalensis* occurs in all parts of El Salvador, so that intergradation with *buxans* must occur somewhere in Nicaragua. Individual specimens will not establish with certainty the belt where this takes place, for the yellowest *guatemalensis* are scarcely, if at all, to be distinguished from the grayest *buxans*, and it is only in series that the differences become obvious.

This ivory-bill, the largest of the local woodpeckers, is nowhere so common as the white-billed pileated woodpecker, in conjunction with which it occurs throughout its range. The reasons for the disparity in numbers between these two species is not clear, unless it be the predilection for large trees shown by the ivory-bills. At any rate they seldom are found in small, second growth, and their local distribution seems to be determined largely by the presence of uncut forest or at least very large, second growth.

Ivory-bills were found in pairs all the year through, except in the early fall, when several small parties, possibly family groups, were seen. It is during this time, when the young of the year augment the former population and cause a pushing out in all directions to locate new territory, that this species becomes a wanderer to a limited extent. In one small patch of timber in a cañon near Lake Olomega, where previously *Ceophloeus* had been the only large woodpecker present, two pairs of ivory-bills appeared on August 9. One of these pairs was shot on that date, and the other on August 27; all were postbreeding adults. On September 13 another pair was collected there, which, from their smaller sized bills, were judged to be young of the year, and less than a week later still a fourth pair was present. These last were left undisturbed.

The disproportionately heavy head and bill is obvious even in flight and is especially evident when seen in profile. This character serves to differentiate easily the ivory-bill from the pileated woodpecker, even at extreme heights from the ground. When pounding, it has a characteristic double rap given rhythmically and with extremely short intervals between raps, little more than a skipped

beat in fact. *Ceophloeus*, on the other hand, seems to have no set cadence.

Nesting.—A male taken on Mt. Cacaguatique November 23 was in full breeding condition, although a female from the same locality was completely dormant.

Plumage notes.—This species closely parallels *Ceophloeus* in early commencement and long duration of the annual molt. A female taken June 11 has progressed as far as the 6th primary, and the body molt has just commenced. In a pair taken August 9 the entire molt is complete except that the outermost primary and the central pair of tail feathers are still partially sheathed. However, another pair taken August 27 are somewhat behind this schedule, for they have just molted the 7th and 8th primaries respectively, although the body molt is complete in both birds. The tail molt is exactly as in *Centurus santacruxi*. A non-breeding male, possibly of the previous year, taken March 12, shows a very extensive spring molt. Postjuveniles, at the completion of the molt, appear to be distinguishable from adults.

Colors of soft parts.—Adults: iris, lemon-yellow; bare skin about eye, slate-color; tarsi and feet, plumbeous; bill, ivory-white, slightly bluish at base.

Stomach contents.—Ant larvae, 1; larvae of wood borers, 3.

Order PASSERIFORMES. Perching Birds

Family DENDROCOLAPTIDAE. Wood-hewers

***Dendrocolaptes certhia sancti-thomae* (Lafresnaye). BARRED WOOD-HEWER. PICA PALO (all species).**

Dendrocops sancti-thomae Lafresnaye, Revue et Mag. Zool., 4, p. 466, October, 1852—Santo Tomás, Honduras.

Specimens collected.—Lake Olomega, 3 (July 30, August 5, 1925); Mt. Cacaguatique, 4 (November 24, December 9, 11, 1925).

Status.—Uncommon breeder in the Arid Lower Tropical Zone about Lake Olomega. Found in winter in the Arid Upper Tropical oak association on Mt. Cacaguatique, where possibly resident.

Remarks.—The barred wood-hewer is a rare bird within the boundaries of El Salvador and the seven specimens listed above are all that came under observation. In spite of the fact that this species was not found between the altitudes of 200 and 3,500 feet, the distribution is really probably continuous in districts where

large timber still exists and, although noted only in the eastern departments, it should occur throughout the country where conditions are favorable. Such birds as were taken were rather tame and unsuspicious and in their habits resembled woodpeckers more than creepers.

Nesting.—A pair taken at Olomega on July 30, 1925, was in breeding condition, and the oviduct of the female contained an egg nearly ready to be laid. This was probably the second nesting, for a full grown juvenile, not improbably the offspring of this same pair, was taken on August 5. The fact that the pair of adults was breeding had in no way interfered with the annual molt, or, to put it another way, the molt had not interrupted breeding, for both, the female especially, are in old, worn plumage with new feathers appearing everywhere on the body, wings, and tail.

Colors of soft parts.—Adults: iris, dark brown; bill, blackish brown, base of mandible paler; tarsi and feet, bluish or greenish horn-color.

Stomach contents.—Large insects, 1; centipede, 1.

***Xiphorhynchus flavigaster flavigaster* Swainson. SWAINSON'S WOOD-HEWER.**

Xiphorhynchus flavigaster Swainson, Philos. Mag. (new ser.), 1, p. 440, 1827
—Temascaltepec, Mexico.

Dendrornis eburneirostris Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 178, 1891—part, Volcán de San Miguel, La Libertad.

Xiphorhynchus flavigaster flavigaster Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 244, 1911—Salvador; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 4, p. 303, 1925—Salvador.

Specimens and records.—Lake Olomega, 11; Puerto del Triunfo, 3; Río San Miguel, 3; Volcán de Conchagua, 5; Volcán de San Miguel, 1; Mt. Cacaguatique, 11; San Salvador, 1; Hacienda Chilata, 1; San José del Sacare, 1. Recorded from Acajutla; La Libertad.

Status.—Common resident in wooded areas from sea level to 4,000 feet. Although typically a bird of the Arid Lower Tropical Zone it also reaches well into the oaks and pines of the Arid Upper Tropical.

Remarks.—Although not quite so common as *Lepidocolaptes souleyetii insignis* with which it is co-extensive in distribution, Swainson's wood-hewer is nevertheless a very common bird in wooded areas below 4,000 feet, where its large size makes it even more noticeable than its smaller relative. It is, furthermore, the

only wood-hewer in El Salvador which does not demand large forest since it occurs not only in gallery forest but even in second growth and low brush.

In its methods of procuring food it is almost as versatile as a flicker and frequently descends to the ground, working among the litter of dead leaves with quick side strokes of the bill. Fallen logs and dead trees are also favorite hunting places, the smaller slabs of bark being pried off and not picked or hammered. Dead branches are often hammered, not with the rhythm of a woodpecker, but in irregular raps like a nuthatch. Some of this pounding is evidently done with the sole object of making a noise, for on Mt. Cacaguatique a dead oak near camp which was hard enough to resist anything but the big ivory-billed and pileated woodpeckers was often used as a pounding board by these wood-hewers.

As the birds work upward on a tree trunk the action is creeper-like, for they hitch spirally around and around the trunk and use the tail for a support. On arriving at the top of the tree they sail to the foot of the next and repeat the process. Backing down, a most unwoodpecker-like proceeding, is done almost as quickly as climbing the tree.

Nesting.—Females containing eggs ready to be laid were shot at San Salvador April 19, 1912 and at Lake Olomega August 11, 1925.

Plumage notes.—The juvenal plumage is very similar to that of the adult, except that it is slightly darker throughout and more heavily streaked both above and below. Birds which are known to be postjuveniles average slightly more buffy than known adults of the same season, but the difference is only average. The best age character, after the postjuvenal molt has been completed, is the shortness of the remiges which, in addition, are more extensively rufous on the inner webs. These are kept a full year, but the juvenal tail, which, like the remiges, is shorter than in adults, is replaced in November and December. The only sex difference in adults, aside from the larger size of the males, is that the rufous of the inner webs of the outer primaries is more extensive and less sharply demarcated in the females. This difference, though not conspicuous, is apparently constant. The annual molt (no spring molt is apparent) takes place in August and September, at a time when late sets of eggs are being laid.

Colors of soft parts.—Adults and full grown juveniles: iris, dark brown; maxilla, dark brown, becoming nearly black at base and

tip; mandible, flesh color or bluish flesh-color; tarsi and feet, greenish horn-color.

Stomach contents.—Larvae of wood borers, 4; small beetles, 1; insect remains, 2.

Xiphocolaptes promeropirhynchus emigrans Sclater and Salvin.
GUATEMALA WOOD-HEWER.

Xiphocolaptes emigrans Sclater and Salvin, Ibis, 1, p. 118, 1859—Central America and Mexico (=San Geronimo, Vera Paz, Guatemala).

Specimens collected.—Mt. Cacaguatique, 1 (December 7, 1925); San José del Sacare, 1 (March 16, 1927).

Status.—Extremely rare resident of the oak-pine association of the Arid Upper Tropical Zone.

Remarks.—On but two dates was this large wood-hewer found in El Salvador, where it seems to be a very rare species indeed. On December 7, 1925, a group of three was seen in the oaks on Mt. Cacaguatique, one of which was collected. These three were extremely shy, and the taking of one bird was the result of a long-range chance shot. A pair, presumably mates, was found working on the bark of a tall oak at San José del Sacare on March 16, 1927. Like the former birds, they were very difficult to approach and flew from tree to tree for some distance before one was finally shot. The other was never seen after its mate was taken. In flight and mannerisms these birds appear to be typical wood-hewers.

Colors of soft parts.—Adult male: iris, brownish red; bill, bluish horn-color; maxilla, brownish basally; tarsi and feet, olive-green.

Lepidocolaptes souleyetii insignis (Nelson). NORTHERN
STREAKED-HEADED WOOD-HEWER.

Picolaptes compressus insignis Nelson, Auk, 14, p. 54, 1897—Otatitlán, Vera Cruz, Mexico.

Picolaptes compressus Salvin and Godman (not *Thripobrotus compressus* Cabanis), Biol. Centr.-Am., Aves, 2, p. 186, 1891—Volcán de San Miguel.

Picolaptes lineaticeps insignis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 266, 1911 (cit. of above).

Lepidocolaptes souleyetii insignis Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 4, p. 332, 1925—Salvador.

Specimens and records.—Lake Olomega, 12; Puerto del Triunfo, 6; Volcán de San Miguel, 3; Rio San Miguel, 1; Chilata, 1; Zapotitán, 1; Lake Chanmico, 3; San Sebastián, 1; Barra de Santiago, 1. Recorded from "Salvador"; Volcán de San Miguel.

Status.—Common resident of the coastal plain and, locally, in the coastal ranges. While confined almost entirely to the Arid Lower Tropical Zone, this species reaches an altitude of 3,500 feet in the Arid Upper Tropical oaks on Volcán de San Miguel.

Remarks.—Considered collectively, the series of skins diverges slightly toward the more southern race, *Lepidocolaptes souleyetii compressus* Cabanis. The two westernmost specimens, from Barra de Santiago and Chilata, respectively, are typical *insignis*. Most of the others are more narrowly streaked both above and below; in fact, they are just about intermediate between the two forms in this respect. However, occasional specimens from such eastern points as Volcán de San Miguel and Lake Olomega are typical *insignis*.

Although this species has penetrated a short distance inland at several places, in at least one of which it reaches an altitude of 3,500 feet, it nowhere comes in contact with the closely related *L. a. affinis* of the interior mountains and Volcán de Santa Ana. The center of population for *insignis* is in the lowlands, where the species is one of the most characteristic gallery-forest birds. This being the case, we were surprised to find it at the extreme upper limit of the Arid Lower Tropical and even a short distance into the oaks on Volcán de San Miguel and at 2,000 feet in the Balsam Range. In the highlands about San Salvador, although conditions appear to be identical with those on Volcán de San Miguel and Chilata, none were ever noted, and it is pretty certain that the species does not occur there.

These wood-hewers greatly resemble, both in form and action, gigantic creepers. Beginning at the bottom of a tree, they work slowly upward, usually spiraling the trunk and branches, then sail downward to the butt of the next. That they can back down a tree almost as well as they can climb was observed several times. At Lake Olomega on several different days a bird was seen to hitch backward into a small cavity where it would remain for minutes at a time. Finally the hole was cut open when, instead of the expected nest, it was found to be half full of water. Whether the purpose of these visits was to obtain water or to glean the cavity for insects is not known.

The usual call-note is a musical trill and is given rather frequently, especially when members of a flock or a pair have become separated. Except when leading families of young these wood-hewers, like other local species of the family, are almost always to be found in pairs.

Nesting.—Males in full breeding condition were taken from March 13 to August 2. Females, either laying, or about to do so, were taken April 11 and August 2. Probably at least two broods are raised each season. A juvenile, completing the postjuvinal molt on August 4 and a young bird just out of the nest August 5, are probably representative of the two layings.

Plumage notes.—The juvenal plumage bears such close resemblance to the adult that sometimes only close scrutiny can determine the age of the specimens in hand. Chief points of difference are the darker and richer ground color, the more prominent black edging to the streaking, both above and below, and the darker-colored bill, which does not attain its full degree of lighter color until the bird is several months old. Postjuveniles seem to average decidedly richer in color than fully adult birds, but there is much individual variation. The postjuvinal molt includes remiges and all except the center pair of rectrices. The wing molt proceeds in normal passeriform fashion, from the carpal joint distally in the case of the primaries. In the five molting young, there is no evidence that the "deck pair" of rectrices is shed at this time. The remaining five pairs are replaced from the inner pairs outward—the outermost pair being the last to be shed. Young in molt were taken from August 2 to August 16. The annual molt of the adults likewise commences about August 1 on an average, although some start a little later and some a little earlier. In molting the tail, the adults shed the innermost ("deck") pair first, and the other five pairs follow consecutively. It will be noticed that despite similar function, the tail molt of wood-hewers is of very different sequence from that of woodpeckers, which, among the local species at least, drop intermediate pairs first, then the outer and the center or "deck" pair last of all. No spring molt is in evidence in several specimens taken in February, March, and April.

Colors of soft parts.—Juvenal male just from the nest: bill, blackish brown; iris, dark brown; tarsi and feet, dark plumbeous. Adults: bill, pale, light brown; basal three-quarters of mandible, bluish flesh-color; iris, dark brown; tarsi and feet, grayish olive-green.

Stomach contents.—Insects, 4; small beetles, 1.

Lepidocolaptes affinis affinis (Lafresnaye). NORTHERN ALLIED WOOD-HEWER.

Dendrocolaptes affinis Lafresnaye, Rev. Zool., 2, p. 100, 1839—Mexico.

Specimens collected.—Mt. Cacaguatique, 14 (November 24 to December 16, 1925); Los Esesmiles, 5 (February 3 to March 5, 1927); Volcán de Santa Ana, 2 (May 10, 16, 1927).

Status.—Common resident of the Humid Upper Tropical Zone on Mt. Cacaguatique, Los Esesmiles, and Volcán de Santa Ana. The vertical range is from 3,500 to 8,500 feet.

Remarks.—El Salvador specimens are narrowly streaked like typical *affinis*, but the throat averages richer buff and thus, in this respect, they tend to vary toward *L. a. neglectus* of Costa Rica and Panama.

Aside from the fact that they occupy different life zones, the general habits of *affinis* and *insignis* are very similar. Both species are lovers of deep woods and are found, as a rule, in pairs. They often accompany wandering troops of vireos, warblers, and tanagers and, in general, may be called "sociable" species. The call-notes of *affinis* are much sharper than those of its lowland relative, and none was ever heard to give the characteristic musical trill of the latter. The most common call-note is very much like the well-known "yapping" call of *Dryobates villosus*, and sometimes it proved exceedingly deceptive.

This is one of the few Humid Upper Tropical species which reaches that zone as represented on Mt. Cacaguatique.

Nesting.—A male taken March 5 on Los Esesmiles was in breeding condition, as were a male and female taken on Volcán de Santa Ana, May 10 and 16, respectively.

Colors of soft parts.—Adults: iris, dark brown; bill, bluish flesh-color, browner at base of maxilla, paler at tip; tarsi and feet, plumbeous, or rarely greenish slate-color.

**Sittasomus griseicapillus sylvioides Lafresnaye. MEXICAN
PYGMY WOOD-HEWER.**

Sittasomus sylvioides Lafresnaye, Rev. et Mag. Zool., p. 590, 1850—Mexico (Bangs and Peters, 1928, designate Vera Cruz, Mexico).

Specimens and records.—Puerto del Triunfo, 1 (January 7, 1926); Lake Olomega, 1 (April 9, 1926); Lake Guija, 1 (May 27, 1927); Zapotitán, 1 (June 11, 1912); Mt. Cacaguatique, 1 (December 19, 1925). Also noted at Volcán de San Salvador (May 30, 1912).

Status.—A rare though widely distributed resident. Detected from sea level to 4,500 feet.

Remarks.—El Salvador specimens of this race average slightly more olivaceous below than do skins from Guatemala, but individual examples from these areas can be matched exactly.

It is apparent that in spite of its rarity the Mexican pygmy wood-hewer is an extremely adaptable species, for it was encountered in associations differing as widely as swamp forest, open woods, coffee shade, and even at 4,500 feet at the lower edge of a small section of cloud forest.

These little wood-hewers remind one strongly of creepers (*Certhia*), and the resemblance is heightened by the light mark across the inner webs of the primaries which is rather prominent when the bird is in flight. It is not unlikely that, as in the case of some other wood-hewers, pairs are more common than single birds, but because they are so quiet and so easily overlooked, the detection of both birds of a pair is often a difficult matter. In feeding, these birds show a decided preference for smooth-barked trees such as *Cecropia* and *Ficus*. Like most wood-hewers, they work from the base of a tree upward, often ascending in spirals and working the undersides of the branches as well as the more accessible parts of the tree.

Colors of soft parts.—Adults: bill, blackish brown with base of mandible paler; iris, dark brown; tarsi and feet, blackish plumbeous.

Family FURNARIIDAE. Ovenbirds

Synallaxis erythrothorax pacifica Griscom. PACIFIC RUFOUS-BREASTED OVENBIRD.

Synallaxis erythrothorax pacifica Griscom, Amer. Mus. Novit., 414, March 24, p. 3, 1930—San Felipe, Retalhuleu, Guatemala; Miller, Condor, 34, p. 14, January, 1932—Lake Olomega; nesting.

Specimens and records.—Lake Olomega, 12; Puerto del Triunfo, 5; Lake Chanmico, 3; Zapotitán, 1. Also noted at Barra de Santiago. Recorded from Lake Olomega.

Status.—Common resident of swampy areas in the lowlands.

Remarks.—All of the specimens are typical of the Pacific coast race, which differs from *erythrothorax* proper in possessing a generally pallid coloration, with a gray instead of black or slate-black throat.

Although this species is the sole representative of the family to be found within the area covered by this report, it is an exceedingly prominent one in swampy areas throughout the lowlands. It is strictly a resident of the undergrowth, either beneath forest or in the dense scrub bordering clearings, and seems never to be found

in regions where little or no woods are left. At Divisadero, a locality of brushy pasture land, not one individual was ever seen or heard; neither were any noted at Colima in the Lempa Valley, a point which several other coastal forest species have reached. The one inland intrusion is up the Sonsonate Valley to Zapotitán and Lake Chanmico. Otherwise the species is confined to the coastal districts.

A notable characteristic of the species is that pairs are the absolute rule from the time the postjuvenile plumage is acquired. These paired young birds take possession of some old nest and for the duration of their lives probably never leave its immediate vicinity. Once selected, a site is a permanent home, no matter what the season of the year. Thus the species is resident in the most restricted sense, more so than any other bird of our acquaintance. In very favorable localities the density of population averages about one pair to a hundred yards, as a rule strung out along a line of brush on banks of woodland streams. The actions of these birds and the type of cover they inhabit combine to remind one very much of wren-tits (*Chamaea*), not the chaparral population, but those of the dense undergrowth of willow bottoms. The alarm notes, a continuous chattering, serve to emphasize the resemblance, though they are sharper and louder than the alarm notes of the wren-tit.

Nesting.—The large nests, built of sticks, thorny twigs, and bark strips are conspicuous objects in the undergrowth wherever the birds are found. Although innumerable nests were seen, the following descriptions will be sufficient to convey an idea of their average characteristics. A nest found at Zapotitán on June 28, 1912, was an enormous, nearly round structure, two and one-half feet long by two feet wide and two feet high. It was built of thorny twigs and sticks, some of which were so large that it would seem impossible for the builders to have lifted them, let alone work them into the nest. The nest cavity was in the center of this mass and was reached by a long, narrow passage from the center of the side. The cavity was very large, about a foot the long way by six inches broad and six inches high. In the center of the floor of this roomy chamber was the nest cup, lined with grass and very fine twigs, and measuring two and one-half by three and one-quarter inches. This nest was seven feet from the ground in a very dense, thorny bush on the bank of a small stream. Another nest, noted at Lake Chanmico on May 16, 1912, was very much smaller, about eighteen by eight by eight inches outside, purse-shaped and resembling in profile a very large nest of the cactus wren. The material was, as usual,

coarse, thorny twigs compactly interlaced, with the interior chamber floored with much finer twigs, grass, and soft bark strips. The site was but two and one-half feet from the ground in a thorny bush. A third nest, examined at Lake Olomega, was about two feet long by one foot wide and one foot high. As an additional protection the owners of this last nest had piled on top of the structure a thatch of bark strips, giving the nest a top-heavy appearance. This nest was six feet from the ground in a thorny mimosa bush.

Nest are usually about ten feet from the ground although extremes of two and one-half and thirty feet were seen. The birds work at the nests throughout the year and make a great fuss over them at all times. Possibly the nests are used as sleeping quarters. At a site there will sometimes be several nests which range in age from a new one, or at least one in excellent repair, to an old collection of rotten sticks ready to fall from place at a touch. The thorny, compactly built affairs must last for a number of years even though deserted, not only because of the heavy construction but also because held by the thicket of spines in which they are usually firmly placed. Just how long a nest is occupied before a new one is started varies, probably, with the peculiarities of individual pairs.

Although several nests were investigated, in only two were there any eggs. The one described from Zapotitán, June 28, 1912, held three eggs, immaculate, pale blue in color, and in which incubation was well started. A nest with two fresh eggs was found at Lake Olomega on August 23, 1925, and these were collected by Alden Miller. The present whereabouts of these eggs is not known, and they are thus not available for measurement or more accurate description.

Plumage notes.—The postjuvénal molt of the body plumage takes place in the fall, its inception varying, in four individuals, from August 4 to September 13. However, the juvenal remiges and rectrices are worn until midwinter when they are completely replaced. Three birds taken January 3 to 9 were just completing this wing and tail molt. The plumage is then identical with that of the adults. The annual molt of adults had commenced in four birds taken between August 10 and 23. The tails of these birds were being replaced along with the body plumage, but the wing molt had not yet begun. There is a more or less extensive spring molt in the adults, at which time a varying number of rectrices (all in one case) may be renewed, as is shown by three

specimens taken May 16 to 18. The male parent of the incomplete set of two eggs taken August 23, 1925, was molting heavily.

Colors of soft parts.—Adults: iris, dark red to reddish brown; bill, black; tarsi and feet, bright plumbeous to greenish plumbeous. Three-fourths grown juvenile: iris, dark brown; bill, dark brown; edge of gape, dull yellow; mandible, pale, yellowish brown; tarsi and feet, bluish flesh-color. The bill in birds of the year does not become solidly black before midwinter.

Family FORMICARIIDAE. Ant-birds

***Thamnophilus doliatus intermedius* Ridgway. MEXICAN ANT-SHRIKE. ARRIERO.**

Thamnophilus intermedius Ridgway, Proc. U. S. Nat. Mus., 10, p. 581, August 6, 1888—Truxillo, Honduras.

Thamnophilus doliatus Salvin and Godman (not *Lanius doliatus* Linnaeus), Biol. Centr.-Am., Aves, 2, p. 202, 1892—part, La Libertad.

Specimens and records.—Barra de Santiago, 6 (April 6 to 10, 1927); Zapotitán, 2 (June 12, 1912; June 20, 1927); Mt. Cacaguatique, 2 (December 20, 1925). Also noted (probably this subspecies) at Miraflores (June 6, 1927). Recorded from La Libertad.

Status.—Common resident of the coastal plain from the extreme southwestern corner of the republic, east, certainly, to Zapotitán and probably to the Lempa. There is also a colony (isolated?) at the extreme upper edge of the Arid Lower Tropical Zone at 3,500 feet on Mt. Cacaguatique (fig. 16).

Remarks.—The peculiar distribution of the two races of *Thamnophilus doliatus* is analogous to that of the two races of *Crypturellus cinnamomeus*; that is to say, the southwestern and northeastern colonies of one form are, locally, completely isolated from each other by the interposition of another race. However, when details of distribution in Guatemala and Honduras become better known than they are at present, the ranges of the El Salvador races of both of these species will appear less puzzling than they do at first consideration. At any rate, the pale-colored *T. d. pacificus* certainly does not extend nearly so far north as has been heretofore supposed. We have seen no birds from the Pacific lowlands of Guatemala, but a male from San Bartolome, Chiapas, in the collection of the Biological Survey is good *intermedius* and Griscom¹ has shown that *intermedius* is the only race of this species to be found in Guatemala.

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 233, 1932.

This ant-shrike is unquestionably an intrusion from the north and probably reached the Pacific coast contemporaneously with *Aimophila rufescens rufescens*, *Icterus gularis gularis*, *Crypturornis cinnamomeus goldmani*, and others.

Although this race was common at Barra de Santiago and Zapotitán, and is probably of continuous distribution between these two points, there seems to be a marked diminution in numbers eastward as one approaches the range of *pacificus*. Only one bird was heard trilling at Miraflores in the four days spent there, and not a single individual was noted at San Sebastián in over two weeks of collecting. That actual intergradation occurs in the area is shown, however, by the fact that one of the four male *pacificus* from Puerto del Triunfo is, by individual characters, closer to *intermedius* than to the form prevailing in that locality.

The close adherence of the southwestern colony of *intermedius* to the coastal plain makes all the more anomalous its occurrence at 3,500 feet at the extreme upper limits of the Arid Lower Tropical Zone on Mt. Cacaguatique.

Nesting.—The taking of a fully grown juvenile at Zapotitán on June 20, 1927, antedates by over three months the earliest dates for juveniles of *pacificus*.

***Thamnophilus doliatus pacificus* Ridgway. PACIFIC ANT-SHRIKE. ARRIERO.**

Thamnophilus doliatus pacificus Ridgway, Proc. Biol. Soc. Wash., 21, p. 193, October 20, 1908—Chinandega, Nicaragua.

Thamnophilus doliatus Salvin and Godman (not *Lanius doliatus* Linnaeus), Biol. Centr.-Am., Aves, 2, p. 202, 1892—part, Volcán de San Miguel.

Specimens and records.—Lake Olomega, 13; Divisadero, 12; Volcán de San Miguel, 4; Puerto del Triunfo, 6; Lake Guija, 2; Colinas de Jucuarán, 1. Also noted at Colima; Rio Goascorán. Recorded from Volcán de San Miguel.

Status.—Common resident of the Arid Lower Tropical Zone in the southeastern corner of the republic and extending up the valley of the Lempa and its tributaries at least to Lake Guija (fig. 16).

Remarks.—The type of intergradation shown between *pacificus* and *intermedius* indicates relatively recent fusion of the two races. Of the seven males from Divisadero one could readily pass for *intermedius* while the other six are typical *pacificus*. Similarly, out of four males from Puerto del Triunfo one has a close resemblance to *intermedius*, while of the two from Lake Guija one is typical *pacificus*, and the other is almost exactly intermediate.

Although the local metropolis of the race is in the hot lowlands and the lower foothills up to an elevation of perhaps 1,000 feet, a fair number occur clear to the upper limits of the Arid Lower Tropical Zone at 2,700 feet on Volcán de San Miguel. At such an altitude, though, one has to search diligently to find them. On the coastal plain this bird is continually in evidence and is one of the most characteristic species of scrub woodlands.

Ant-shrikes are birds of the undergrowth. They inhabit a wide variety of associations and seem to be equally at home in the mimosa thickets of Divisadero and in the palm thickets of the coastal swamp

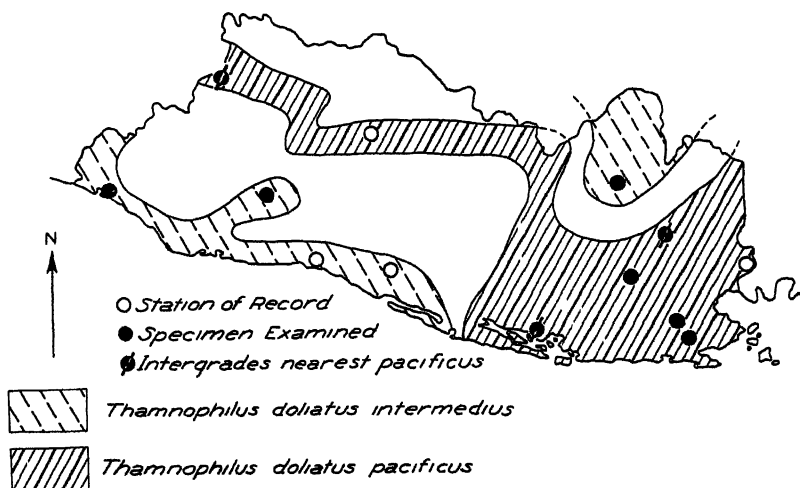


FIG. 16. Distribution of two races of the ant-shrike, *Thamnophilus doliaetus*, in El Salvador.

forests. Like a few other species, for example, Baird's gnatcatcher and the rufous-breasted ovenbird, they pair off even before the juvenal plumage has been shed and are found in couples at all times. The common call is a musical trill, sustained on one note for the period of a second or more and repeated at frequent intervals. Both sexes trill, as was determined with certainty many times; in fact, one of the first trilling birds taken was a female which was still partly clothed in the juvenal plumage. These birds also have a harsh, scolding note, very vireo-like in quality, which is used only as an alarm note and accompanied by a raising of the bushy feathers of the crown.

Nesting.—Five juveniles were taken at Divisadero between September 28 and October 16, 1925. Two males, one fully adult

and one of the previous year, taken at Lake Guija, May 24 and 27, 1927, were not breeding at the time they were collected. A female taken August 3, 1925, was incubating.

Plumage notes.—The postjuvénal molt is a complete one, except that several, usually all, of the juvenal coverts (as in the American quails) are retained until the first annual molt. The postjuvénal plumage otherwise resembles that of the adult, except that in the males there is usually a slight brownish tinge to the flank feathers, and the white spots on the remiges are often tinged with pale yellow. The clear, black and white wings and flanks of maturity are attained the second fall. One-year-old birds and adults go through the fall molt at much the same time, although its beginning naturally varies somewhat with different individuals. It is just commencing in a fully adult male taken August 3, and is but slightly more advanced in a one-year-old male taken August 13. Most birds are about halfway through the molt by September 1, although two males taken at Divisadero September 24 and 28, are but little beyond this point.

The retention of the juvenal primary coverts is probably common to a great many more species than supposed. Except in species whose juvenal coverts are different from those of adults, their detection is difficult but when they can be recognized, they provide an unfailling clue to age.

Colors of soft parts.—Adults: iris, ivory-white; maxilla, black with tomia pale blue; mandible, pale blue; tarsi and feet, bright plumbeous (almost delft blue). Juveniles: similar, but maxilla tinged with brown and iris with grayish yellow.

Stomach contents.—Insects, 10; insects and (ant?) larva, 1; small berry seeds and insects, 2.

***Grallaria guatemalensis guatemalensis* Prévost and Des Murs.**
GUATEMALAN ANTPITTA.

Grallaria guatemalensis Prévost and Des Murs, Zool. Voy. Venus, Atlas, livr. 1, p. 199, pl. 4, "1846" (=1842)—Guatemala.

Specimens collected.—Volcán de Santa Ana, 3 (May 7, 13, 16, 1927).

Status.—Fairly common in summer, and probably permanently resident, in the Humid Upper Tropical Zone on Volcán de Santa Ana.

Remarks.—The three specimens taken (all males) seem to be typical of this race.

None was seen other than those collected. The first fluttered from under the wilted foliage of a fallen treetop at 5,000 feet on Cerro de Los Naranjos. The second was found caught in a small steel trap set in a hollowed-out place at the base of a leaning tree at 6,100 feet on the main mountain. The trap had been baited with oatmeal, but the bird had probably blundered into it by accident, for the stomach was empty and the bait untouched. The third was noticed as it was walking slowly about in an open area on the forest floor. In life the short tail was carried erect and, except for the large head, the bird appeared very rail-like in carriage. This third example was shot at almost the identical spot where the first one was found. It is a young bird possibly belonging to the adult collected there a few days before.

Plumage notes.—The young male taken May 16 had finished the postjuvinal molt some time before, for no pin feathers were in evidence anywhere. The spotted, juvenal, greater wing coverts and two of the middle coverts have been retained. Both adult males were in fresh, recently acquired plumage, and both were sexually dormant.

Colors of soft parts.—Adult male: iris, dark brown; bill, black, fading to flesh color on base of mandible; tarsi, feet and claws, plumbeous.

Stomach contents.—Large insects, 1.

Family PIPRIDAE. Manakins

Chiroxiphia linearis fastuosa (Lesson). LONG-TAILED MANAKIN. CRUZERO, TOLEDO.

Pipra fastuosa Lesson, Rev. Zool., 5, p. 174, 1842—Realejo, Nicaragua.

Chiroxiphia linearis Hellmayr (not *Pipra linearis* Bonaparte), Field Mus. Nat. Hist., Zool. Ser., 13, pt. 6, p. 52, 1929—part, San Salvador.

Specimens and records.—Lake Olomega, 11; Puerto del Triunfo, 3; Rio San Miguel, 4; Volcán de Conchagua, 2; San Salvador, 4; Volcán de San Salvador, 1; Chilata, 1; Barra de Santiago, 2. Recorded from "San Salvador."

Status.—Common resident of forest undergrowth, coastwise, throughout the Arid Lower Tropical Zone and found locally in the Humid Upper Tropical. The species is far more common on the coastal plain than in the hill region.

Remarks.—Bangs and Peters¹ have recently recognized two races

¹ Bull. Mus. Comp. Zool., 68, no. 8, p. 397, October, 1928.

of the long-tailed manakin, a shorter-tailed form with a larger bill inhabiting "Mexico and Guatemala" and a longer-tailed, smaller-billed form occurring in "Nicaragua and Costa Rica." It is with considerable hesitancy that we place our El Salvador specimens with the southern race, for they are, taken as a series, precisely intermediate. In length of tail the nine adult males with fully grown, unabraded rectrices, average 150 mm. thus approximating Costa Rican examples of *fastuosa*. On the other hand, the bills of the entire El Salvador series of twenty-eight are slightly but definitely larger than those of Costa Rican birds. El Salvador females are slightly grayer and duller in color than typical *fastuosa*, but whether or not this is characteristic of the northern race *linearis*, we do not know, having seen no females of that form. We follow Miller¹ and Hellmayr in considering the genus *Chiroprion* synonymous with *Chiroxiphia*. By the analogy of the distribution of several other species it would not be surprising to find the northern race in western El Salvador, and such may eventually prove to be the case. We have insufficient material to decide the question, for in the present series there is but one adult male from Chilata, and there are two females from Barra de Santiago.

The long-tailed manakin is common and generally distributed through forested areas on the coastal plain and less numerous up to 4,500 feet in the coast range. It does not appear to have worked down into the central valley, however, and San Salvador is about the northern limit of its local range. This is in close accord with the manner of distribution in Costa Rica,² where the species reaches an altitude of 5,000 feet on the Pacific slope but only very rarely "spills over" into the interior valleys. The typical habitat is thin, low growth beneath medium height forest, but the thicker underbrush of more open tracts is by no means avoided. On the coastal plain this manakin is particularly numerous, and there the peculiar snarling notes and clear silvery "To-lé-do" of the males may be heard most frequently on hot, still days. The snarling note resembles the whine of a spotted towhee, but is given with a descending instead of rising termination. It is alternated more or less with the "tolédo" call.

Manakins are noted for their extraordinary courting antics when two or more males gather about one female in the breeding season. At Barra de Santiago in early April, 1927, at least three and possibly more males were seen for a few seconds going through an amazing

¹ Bull. Amer. Nat. Hist., 24, p. 341, 1908.

² Carriker, Ann. Carnegie Mus., 6, p. 682, 1910.

series of courtship displays. They were leaping from branch to branch in front of and over a female perched quietly only a few inches from the ground in undergrowth near a trail. The leaps were very rapid, back and forth without a pause, and with scarlet crests and blue backs bushed out to the fullest advantage. All this was accompanied by frequent bill snappings and incessant repetitions of both the snarling and toledo notes. In spite of their apparent absorption they ceased instantly and scattered into the undergrowth at my first movement to secure a better view.

Plumage notes.—Except for the slightly longer and narrower central tail feathers of the males, there appears not to be the slightest sex difference between juveniles of this species. However, the males almost immediately begin to assume the red crown patch, which is the very first part of the postjuvinal plumage to be acquired. This is well shown in two specimens taken July 20 and August 6. When the postjuvinal molt is complete, the young males possess the red crown and the velvet-black, plushlike feathers of the forehead just as in adult males. The remainder of the head, throat, and chest are dull slaty black, mixed with green. The back sometimes has a few pale blue feathers, but is nevertheless predominantly green. The central rectrices are slaty black or blackish olive and considerably shorter than those of adults. The remainder of the plumage is much like that of the female. That this is also the first nuptial plumage is shown by a bird which, when collected on April 18, was in full breeding condition. The subadult plumage is acquired the second fall (first annual molt) and resembles the adult except that the back and wings show a slight admixture of green, and the underparts are dull black, mixed with greenish or slate color posteriorly and laterally. The adult plumage comes with the second annual molt. In not one of the fifteen specimens of both sexes taken in the spring months is there the slightest evidence of a spring molt. The females often have the napes plucked nearly bare of feathers in the breeding season. These feathers are soon replaced, but this can scarcely be considered as a normal molt. The annual molt begins some time in July, for several specimens taken between August 3 and 9 are about halfway through molting, and one taken August 18 has practically finished.

Colors of soft parts.—Adult male: iris, dark brown; bill, black; tarsi and feet, orange-yellow or yellow-orange. Adult female and juveniles of both sexes: similar, but bill dark brown.

Stomach contents.—Single ant, 1; berry or fruit pulp and seeds, 3.

Family COTINGIDAE. Cotingas

***Attila spadiceus salvadorensis* Dickey and van Rossem.**

EL SALVADOR ATTILA.

Attila spadiceus salvadorensis Dickey and van Rossem, Proc. Biol. Soc. Wash., 42, p. 217, December 14, 1929—Lake Olomega, Dept. San Miguel, El Salvador (and localities listed below).

Attila spadiceus flammulatus Hellmayr (not *Attila flammulatus* Lafresnaye), Field Mus. Nat. Hist., Zool. Ser., 13, pt. 6, p. 138, 1929—part, Salvador (crit.).

Specimens collected.—Lake Olomega, 4 (August 3, September 2, 1925; April 7, 1926); Rio San Miguel, 1 (February 6, 1926); Chilata, 3 (April 29, 1927); Miraflores, 2 (June 5, 1927).

Status.—Uncommon resident of the Arid Lower Tropical Zone, both on the coastal plain and up to 2,000 feet in the coastal mountains, but apparently absent from all interior points.

Remarks.—The El Salvador race belongs to the large, brown-backed northern group and combines the pale coloration of the northwestern *A. s. pacificus* (= *cinnamomeus*) with the yellow (not ochraceous) rump and more grayish pileum of the northeastern *flammulatus*. In the brown extreme, the pileum is concolor with the back, but specimens are still distinguishable from *pacificus* by the yellow rump. The decidedly larger size of *salvadorensis* (wings of males, 95–98; of females, 90–91) will prevent confusion with the tawny phase of *Attila spadiceus citreopygus* which has been called “*luteolus*” by Ridgway. We are inclined to suspect that the three specimens listed by Griscom¹ from the Pacific slope of Guatemala belong to the present race.

The ten specimens collected were secured in a variety of situations, varying from dense undergrowth in the swamp forest to treetops a hundred feet or more above the rocky bed of a steep-walled ravine. Normally, they appear to be birds of the treetops, and for this reason are rather difficult to find. The very musical trill, the ordinary call-note, is often extremely hard to locate since, like cotingas generally, these birds are rather sedentary and may remain perched in one place for some time.

Nesting.—A female taken February 6 showed no signs of breeding. A male taken April 7 was in full breeding condition, and a pair of adults collected on April 29 were accompanied by at least three young but recently from the nest. Two single males taken June 5

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 277, 1932.

were in breeding condition, and to judge by their actions they had nests or young close by. A juvenile taken August 3 was evidently out of the nest only a short time for, although fully plumaged, it was not full-grown and the plumage shows no abrasion. It appears that the breeding season is from April to July, although no nests were found.

Plumage notes.—Although dorsally the series is very uniform, the underparts of both adults and juveniles show suffusion of colors varying from yellowish olive-green to pale, reddish brown on the chest and flanks. Curiously enough the variation is practically confined to the five females (three adults and two juveniles), no two of them being alike, while the five males (four adults and one juvenile) are all very uniformly colored. In the case of the pair collected with one young bird at Chilata on April 29, the female is strongly suffused with yellowish olive-green on the pectoral region, while the male is only lightly tinged with grayish brown. The single offspring of this pair which could be collected is a male and is a color duplicate of its male parent. Every effort was made to secure the other members of the brood, but without success.

The only specimen showing molt is an adult taken August 3. The outside pair of tail feathers are about half grown out and are the only pair which had been renewed on the date of capture. The wing molt has progressed to the fourth primary, starting at the carpal joint. The body molt is about half completed.

Colors of soft parts.—Adult male: iris, bright, brownish red; maxilla, brownish horn-color, extreme tip dull white; mandible, bluish flesh-color; tarsi and feet, bright, plumbeous blue (nearly delft blue). Juvenal female: iris, pale, brownish gray to pale, grayish brown; bill, dark brown with central third of mandible flesh color; tarsi and feet, delft blue.

Stomach contents.—Insects exclusively, 2. A pair was observed catching insects from the swarms about a flowering ceiba tree on February 6, 1926.

***Pachyrhamphus major australis* Miller and Griscom. NICARAGUA
BECARD.**

Pachyrhamphus major australis Miller and Griscom, Amer. Mus. Novit., 159, p. 3, February 16, 1925—San Rafael del Norte, Nicaragua.

Specimens collected.—Mt. Cacaguatique, 1 (December 6, 1925); Volcán de San Miguel, 2 (March 20, 1926); Chilata, 1 (April 28, 1927).

Status.—Rare resident above 2,000 feet. Occurs in the Arid Lower Tropical Zone in the Balsam Range and in the oak association of the Arid Upper Tropical Zone on Volcán de San Miguel and Mt. Cacagatique.

Remarks.—These four specimens bear out well the characters ascribed to this race by Miller and Griscom so it appears that *australis* may occur uninterruptedly from northern Nicaragua to northern Guatemala wherever there are suitable highlands.

The single specimen from Mt. Cacagatique, a postjuvenile male, was shot from some tall oaks at 3,500 feet in the Arid Upper Tropical. It was a member of a mixed assemblage of small birds which were flying excitedly about a half-grown, sleeping porcupine curled up in a bunch of oak foliage. On Volcán de San Miguel a female and a one-year-old male were found in the then leafless oaks. These birds were evidently a mated pair for they stayed close together. The third and last time that the species was encountered was when a solitary, fully adult male was taken in trees over a coffee grove at Chilata.

In life these becards are very similar to the closely allied *Platypsaris aglaiae*. The flight is direct and heavy, and there is little of lightness in any of their movements. It is evident that this species is not to be looked for in the lowlands but is confined to the cooler climate of the higher hill country. None of the birds seen were at all shy, and all were easily taken. It appears that the scarcity of specimens in collections is because of actual rarity in numbers and not because, as in the case of some other species, they are easily overlooked.

Plumage notes.—The two postjuvenile males resemble the single adult male very closely and, except for the normal ninth primary, differ only in the creamy (instead of pure white) wing-edgings and less purely gray cervical collar and rump.

Colors of soft parts.—Adult and postjuvenile males: iris, dark brown; bill, plumbeous, darker on culmen and at tip, tomia, pale blue; tarsi and feet, plumbeous blue. Female: similar, but culmen broadly black from nostrils to tip.

***Platypsaris aglaiae latirostris* (Bonaparte). GRAY BECARD.**

Pachyrhamphus latirostris Bonaparte, *Compt. Rend.*, 38, p. 658, 1854—Nicaragua.

P[latypsaris] aglaiae Ridgway (not *Pachyrhynchus aglaiae* Lafresnaye), *Man. N. A. Birds*, p. 324, 1887—part, Salvador.

Platypsaris aglaiae latirostris Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 855, 1907, San Salvador (crit.); van Rossem, Condor, 16, p. 12, January, 1914—Salvador; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 6, p. 201, 1929—"Pacific slope of Salvador, west to Salvador City."

Specimens and records.—Lake Olomega, 9; Rio San Miguel, 4; Rio Goascorán, 1; Puerto del Triunfo, 8; Monte Mayor, 1; Divisadero, 8; Hacienda Miraflores, 2; San Salvador, 5. Recorded from San Salvador.

Status.—Common resident of the Arid Lower Tropical Zone from the extreme eastern limits of El Salvador west to about $89^{\circ} 20'$.

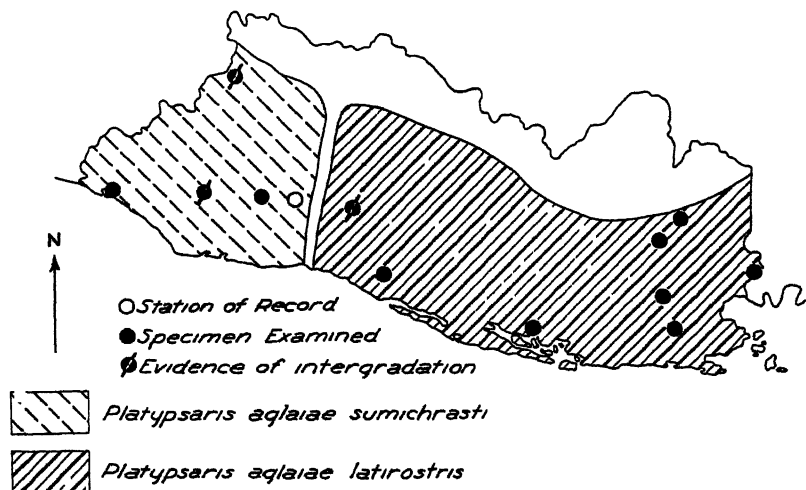


FIG. 17. Distribution of two races of the becard, *Platypsaris aglaiae*, in El Salvador.

The extreme limit in altitude reached by the species is 2,300 feet (fig. 17).

Remarks.—Considered collectively, specimens from east of about longitude 89° are typical *latirostris*. The backs of the males are "dark neutral gray," and contrast sharply with the glossy black nape; the underparts are "neutral gray" or "light neutral gray," and the throat patch is pale and restricted in area.

Becards are ordinarily rather quiet, sedentary birds, usually to be found in pairs in thin, second growth and about the edges of clearings and open places such as trails and roads. Their habit of sitting motionless for minutes at a time is one which may cause them to be easily overlooked. Though the normal habitat is gallery forest, they are by no means averse to brushy, cut-over land and were

quite common in the taller mimosa growth about Divisadero. A few were found in the heavy, swamp forest at Puerto del Triunfo, where they were observed in the thin foliage between the ground and the thick forest crown.

Nesting.—A male in full breeding condition was taken at San Salvador April 3, 1912, and on April 10 of the same year, a male was seen with a beak full of nesting material. Two one-year-old males taken at Olomega April 9, 1926, were in full breeding condition and were paired with females. A juvenile only recently out of the nest was taken at Miraflores on June 7, 1927. It seems that nesting takes place a little earlier than in the case of *sumichrasti*. Probably the nesting habits do not differ from those of the latter race.

Plumage notes.—Sequence of plumages in the males has been worked out with the combined series of *latirostris* and *sumichrasti*, since the two are identical in this respect. Two juvenal males are identical in coloration with the black-headed phase common to both juvenal and adult females. After the postjuvenal molt the young males resemble the black-headed females, except that the upperparts are darker and more grayish brown, the underparts are paler and more grayish buffy, and the throats are frequently tinged with pale salmon-pink. The primaries, secondaries, and rectrices are not replaced at this molt, but are worn until the first annual molt the subsequent fall. During the first winter and spring, occasional feathers are added to the body plumage (there seem at this stage always to be a few pin feathers about the head) and in the spring the innermost tertials are renewed, but there is no definite spring molt which results in a change of the type of plumage worn. Males, at least, breed in this immature plumage. Eight examples of this one-year-old-stage were taken. They were collected in September, October, January, April, May, July, and August; those of the last two months are in the first annual molt.

The second-year plumage, which is attained at the first annual molt, is very similar to that of the fully adult male, but the underparts and rump are strongly tinged with brownish or olive, the rectrices show terminal edgings or mottling of cinnamon and the throat averages less extensively pink. The abbreviated ninth primary is acquired at this time. Of these second-year males there are six specimens taken in January, February, May, and September, besides two critical examples which show the transition from first-year to second-year plumage.

Sixteen males are probably fully adult. In these there is some variation in the purity of the grays of the body plumage, and it is not improbable that those showing the least amount of brownish are the oldest. The throats of second-year males of *latirostris* vary from grayish white with no trace of red, to almost solid "old rose," "rose doree," or "eugenia red." Fully adult males of this race appear always to have some color.

The females of *latirostris* exhibit not only two phases of plumage as suggested by Ridgway for some of the allied races, but *three*. These three types, while not separated from each other by hard and fast lines, are, nevertheless, very distinct on an average. They occur independently of age or season, there being pure juveniles as well as adults of all three types at hand. In the palest, or brown-headed, phase the loreal region is grayish white, the forehead pale, brownish gray, darkening into dull, brownish gray on the crown and grayish brown on the nape. The back is between "sanford's brown" and "tawny." In the gray-headed phase the crown and nape are "deep neutral gray" or "dark neutral gray" with, usually, some indistinct, brownish edgings to the feathers, and the backs average slightly darker than in the brown-headed birds. The black-headed phase varies on the head from "blackish-slate" to "slate-black," and the backs average close to "cinnamon brown." The series of seventeen females of this race is divisible into five brown, one intermediate between brown and slate, six slate, and five black-headed birds, the proportions, therefore, being practically equal.

In addition to the above described "normal" plumages of males and females there is a fully adult male exactly like the "brown-headed" type of female, including even the normal (not abbreviated) ninth primary. This specimen (No. 15,916) taken October 3, 1925, at Divisadero, has finished the annual molt and is in perfect, new plumage. There can be no question as to the sex or age of this specimen, for the testes were not yet completely dormant, and, in addition, the bird possessed the blue mandible of maturity.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; maxilla, blackish plumbeous; mandible, plumbeous blue, nearly "delft blue"; tarsi and feet, plumbeous blue. Juveniles: similar, but maxilla, blackish brown; mandible, flesh color, usually tinged with lilac or pale brownish. The mandible becomes slightly darker during the first winter, but does not assume its blue coloration until sexual maturity the following spring.

Stomach contents.—Berry seeds and fruit pulp, 6; berry seeds, pulp and insects, 3; insects exclusively, 1.

***Platypsaris aglaiae sumichrasti* Nelson. SUMICHRAST'S BECARD.**

Platypsaris aglaiae sumichrasti Nelson, Auk, 14, p. 52, January, 1897—Otatitlán, Vera Cruz, Mexico; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 6, p. 200, 1929—Lake Guija; Zapotitán.

Specimens and records.—Lake Guija, 16; Barra de Santiago, 1; Zapotitán, 1; Sonsonate, 4, 11. Also noted (probably this subspecies) at Lake Channmico.

Status.—Common resident of the lowlands and lower hill country west of about 89° 20' W. (fig. 17). Intergradation between *sumichrasti* and *latirostris* takes place over a relatively wide belt.

Remarks.—One of the specimens from San Salvador might as well be classified as one race as the other, but the average from that locality is decidedly toward *latirostris*. The most easterly known point in the range of typical *sumichrasti* is Zapotitán, the single specimen from there, an adult male, being definitely of that race. Of the fifteen from Sonsonate, eleven are closer to *sumichrasti* and four to *latirostris*. Several of the sixteen examples from Lake Guija are also more or less intermediate toward *latirostris*, but, on the average, the extreme western population, both coastally and in the interior, is easily referable to *sumichrasti*. The characters which distinguish *sumichrasti* from *latirostris* are principally those of darker coloration. The backs of the males are very dark, in extreme cases almost black and concolor with the pileum; the underparts average between "mouse gray" and "neutral gray," and the red on the throats is darker than in *latirostris*. The females are darker and browner, both above and below, than the females of *latirostris*.

Nesting.—Breeding seems to take place later than in the case of *latirostris*. At Lake Guija in late May, 1927, several nests were found, either containing eggs or in the course of construction, and there were no juveniles about to indicate that this was a second laying.

The nests are very large structures built of grass and other loose, pliable material, resembling in type nests of *Todirostrum cinereum finitimum* (see plate). They are, of course, very much larger, some of them a foot long and eight inches in diameter, not including the long streamers of grass hanging from the lower part. The nest cavity is reached from a hole in the side, the entrance of which is protected by overhanging strands from the sharply sloping roof,

and the cup is well padded and felted with the softest possible material. The usual site is the spray of foliage at the end of a long, drooping branch, twenty or thirty feet above the ground and, more often than not, entirely inaccessible.

It seems to be the invariable custom of this species to swing its nests close to the nests of the three, common, breeding species of *Icterus*, namely, *gularis*, *sclateri*, and *pectoralis*. A nest of *Icterus sclateri alticola* found at Lake Guija on May 23, 1927, and which contained eggs nearly ready to hatch, had, a few feet to each side of it, two nests of the becard, one containing five eggs incubated about one-half, and the other about half built. Another out-of-the-ordinary custom is that becards keep adding masses of material to their nests long after the eggs are laid, and one or the other of the pair is continually bringing in great beakfuls of trash. Weatherproofing of the nest chamber seems to be attained by sheer bulk rather than by careful arrangement of material.

Two sets of eggs were obtained by the simple expedient of shooting off the slender branches to which the nests were attached and catching the nests as they fell. One of these, taken at Lake Guija on May 23, 1927, held five eggs, two of which were broken in the thirty-foot drop. The remaining three measure 23.9×17.5 ; 23.3×16.9 ; and 22.4×7 . In ground color the larger two are between "vinaceous buff" and "avellaneous" with shell markings of "bone brown," "natal brown" and "army brown," thinly scattered as small streaks and irregular spots over the whole surface, but coalesced into a wreath of heavy blotches about the larger end. The third egg of this set is very different, having a ground color of very light "pale olive gray" with scattered spots and small irregular markings of "mouse gray," "quaker drab," and various shades of pale brown. The markings are more numerous, but do not form a wreath, about the larger end. It may have been laid by a bird other than the parent of the larger two. The second nest, taken at Lake Guija, on May 24, 1927, contained a single egg nearly ready to hatch. It is very different from any of the three eggs in the first set both in size and color. It measures 25.0×16.3 . In color it is immaculate "pale ochraceous salmon" with a solid cap of minute, coffee-colored spots at the larger end. Both parents were collected with each of these nests so there can be no question of identity.

Plumage notes.—See *Platypsaris aglaiae latirostris* for plumage sequence. The females of this race have the three types of head coloration seen in *latirostris*.

Colors of soft parts.—Exactly as in *P. a. latirostris*.

***Tityra semifasciata personata* Jardine and Selby. MEXICAN TITYRA.**

Tityra personata Jardine and Selby, Illustr. Orn., 1, pt. 2, pl. 24, June, 1827—Real del Monte, Hidalgo, Mexico.

Tityra semifasciata personata Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 871, 1907—part, "San Carlos" (=La Unión); Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 6, p. 214, 1929—Salvador.

Psaris tityroides Lesson, Rev. Zool., 5, p. 210, July, 1842—San Carlos, Centre Amérique (=La Unión, El Salvador).

Specimens and records.—Lake Olomega, 9; Rio San Miguel, 2; Mt. Cacaguatique, 3; Volcán de San Miguel, 1; Volcán de Conchagua, 2; San José del Sacare, 1; Sonsonate, 1; San Salvador, 5. Also noted at Lake Chanmico; Puerto del Triunfo; Colima, La Palma. Recorded from San Carlos (=La Unión).

Status.—Common resident of wooded areas throughout the Arid Lower Tropical Zone. Locally it may be found at the lower edge of the Arid Upper Tropical. The highest elevation at which the species was found was 3,600 feet.

Remarks.—Only two out of the series of twenty-four specimens approach *T. s. costaricensis* in paleness of coloration. Both of these are adult males taken at Lake Olomega. However, the other seven examples from that locality are typical of the northern race. *Psaris tityroides* Lesson is, of course, a synonym of *personata*, as was correctly inferred by Ridgway, although El Salvador was not specifically included by him in the range ascribed to *personata*.

Although resident in the sense that individuals may be present in almost any lowland locality throughout the year, this species is ordinarily encountered in small flocks traveling through the woods. It seems certain that they wander a good deal and that their movements depend largely on the local ripening of favorite fruits and berries.

Like most cotingas, they have a heavy, stolid appearance and when alighting often do so with an audible thump of feet on the branches. The only note they were ever heard to utter resembled the croaking of a small frog. It is given by old and young, usually as an alarm note, when a family party or small flock first launches into flight, although it was often heard from scattered birds feeding in the treetops. The small flocks are probably family parties which stay together long after the young are grown.

Nesting.—A bird in juvenal plumage was taken August 15 and another just starting the postjuvenal molt on August 17. This, as well as other evidence, places the nesting during the summer months, just as with the other local cotingas.

Plumage notes.—Juvenal males and females appear not to differ and, except for the darker pileum and whiter, more contrasted tertials, there is little by which to distinguish postjuvenal males from adult females. The juvenal rectrices and remiges are (as in *Platypsaris* and *Pachyramphus*) kept until the first annual molt. During the winter and spring some few grayish feathers appear in the head, but there is no pronounced, or even definite, spring molt. The annual molt is well under way in a fully adult male taken July 14, and is complete except for the three outer primaries and the outermost pair of tail feathers in an adult male taken September 2. The tail molt is extremely irregular in sequence.

Colors of soft parts.—Juveniles: iris, dark brown; bill, black, basal half (except culmen) reddish flesh-color; facial skin, similar to basal half of bill; tarsi and feet, bluish horn-color. Adults (sexes alike): similar to juveniles, but basal half to three-fifths of bill (including culmen) and bare skin of face, dull, rose pink.

Stomach contents.—Except for the addition of a single caterpillar in one case, five stomachs contained only berries or fruit pulp. Tityras were seen eating large quantities of mistletoe berries on Mt. Cacaquatique in November and December, 1925.

Family TYRANNIDAE. Tyrant Flycatchers

Sayornis nigricans aquatica Sclater and Salvin. GUATEMALA BLACK PHOEBE.

Sayornis aquatica Sclater and Salvin, Ibis, 1, p. 119, 1958—Dueñas, Guatemala.

Specimens and records.—Chilata, 10 (April 28, 29, 1927). Also noted at La Libertad (July 1, 1927); San Salvador (July 4, 1927).

Status.—Uncommon and extremely local in summer (possibly resident) along rocky streams in the Balsam Range and in the vicinity of San Salvador.

Remarks.—With the material at hand we are unable to recognize more than one form of the black phoebe in Central America. While there is no doubt *Sayornis nigricans amnicola* Bangs of western Panama and Costa Rica averages more extensively sooty below, with consequent restriction of the white abdominal area, than does

aquatica, it is a question whether, in view of the great individual variation found, *amnicola* had not better be merged with *aquatica*. El Salvador specimens which have uniformly sooty under tail coverts seem to be absolutely indistinguishable from Costa Rican examples of *amnicola*, while those having white under tail coverts streaked mesially with dusky and correspondingly larger white abdominal areas show a definite approach to *S. n. nigricans* of southern Mexico. As a matter of fact the black phoebes of northern Central America are simply an aggregation of highly variable intergrades between *nigricans* and "*amnicola*." Unfortunately *aquatica*, described from a region of intergrades, has many years priority over *amnicola*.

Both the *amnicola* and *nigricans* types are present in the El Salvador series, those with sooty under tail coverts predominating. Of the six adults there are three with sooty, two with intermediate, and one with white under tail coverts, while of the four juveniles three are sooty and one is white. It is noticeable that those which are most worn have the brownest body plumage. A young bird changing into postjuvénal plumage shows new feathers just as sooty as the darkest *amnicola* from Costa Rica. At present we believe the following forms to be recognizable:

Sayornis nigricans semiatra (Vigors). Western United States and northwestern Mexico.

Sayornis nigricans nigricans (Swainson). Northeastern, central, and southern Mexico.

Sayornis nigricans aquatica Sclater and Salvin. Central America and western Panama.

Hellmayr¹ treats South American *Sayornis latirostris* (Cabanis and Heine) as a form of *nigricans*—a course we are not inclined to follow—though admitting it to be a matter of personal choice.

The black phoebe is an extremely local bird in El Salvador. We searched for it on all streams and lakes, both in the lowlands and in the hill regions of the interior, during 1912, 1925, 1926, and the early months of 1927, but without success, until finally we found it in a rocky gorge at Chilata in the Balsam Range in April, 1927. In addition to the small colony at Chilata a single pair was seen about the artificial pond at the hydro-electric plant at San Salvador on July 4, and a single bird in a rocky ravine near La Libertad on July 1. Evidently certain of the streams in the Balsam Range are inhabited from sea level to the headwaters at about 2,000 feet.

¹ Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 57, 1927.

Nesting.—Running through Hacienda Chilata is a steep-walled ravine down which courses a small stream in a series of rapids, waterfalls, and deep pools bordered by overhanging lava rocks. The rocks, as well as the walls of the ravine, are grown with moss and ferns, while curtains of vines often hang to the water's edge. Because of the rough nature of the ground the original timber has been left standing along both sides of the stream, and the foliage from opposite banks often meets overhead, a hundred feet or more above the stream bed. On April 28, 1927, an old phoebe nest was discovered in a rock niche overhanging a deep pool, and a few moments later an occupied nest containing three newly hatched young was found in a similar situation only a few feet from the old one. On both this and the following day several miles of this stream were carefully searched for phoebes. There was a breeding pair about every mile of its course for a distance of some miles and, besides these, several fully grown juveniles were noted in the intervals between nests. It was obvious that the favorite spots had been used year after year, for near each of the four occupied nests were several old ones, usually completely grown with bright green moss, although preserving the usual outlines. The four nests found contained, respectively, two eggs with incubation about two-thirds advanced, three newly hatched young, three young about half-grown, and a single young nearly ready to leave the nest. All the nests were of the typical black phoebe type of construction, that is, of mud pellets and lined with fine grass stems. They were placed in niches of great rocks overhanging deep pools or waterfalls. Fully grown juveniles were also taken, so the nesting season evidently begins early in the year. The two white eggs, each of which has about a dozen minute brown spots, measure 19.1×14.9 and 19.1×14.5 .

Plumage notes.—A juvenile female taken April 28, already has half-finished the postjuvénal molt even at this early date. The juvenal body plumage must be carried a very short time, for the wing and tail feathers show no wear and have only recently reached full growth.

Colors of soft parts.—Adults: iris, dark brown; maxilla, tarsi and feet, brownish black; mandible, dark brown with tip black and base yellowish.

***Muscivora forficata* (Gmelin). SCISSOR-TAILED FLYCATCHER.**

Muscicapa forficata Gmelin, Syst. Nat., 1, pt. 2, p. 931, 1789—Mexico.

Muscivora forficata Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 715, 1907
—Acajutla.

Specimens and records.—Divisadero, 7 (October 10, 17, November 13, 14, 1925); Puerto del Triunfo, 1 (January 15, 1926); San Salvador, 1 (February 22, 1912); Barra de Santiago, 1 (April 9, 1927). Also noted at Colima (January 26, 1927); Lake Ilopango (March 18, April 13, 1912); Divisadero (October 20 to 30, 1925; April 5, 1926); Volcán de San Miguel (March 11, 1926); San Salvador (April 15 to 27, 1926). Recorded from Acajutla.

Status.—Common, locally abundant, fall and spring migrant and less common winter visitant in the Arid Lower Tropical Zone. Extreme dates of arrival and departure are October 10 and April 27.

Remarks.—The first scissor-tailed flycatchers to arrive in the fall were noted at Divisadero on October 10, 1925, when a single adult female was taken in a dead-topped tree in an old cornfield. On the 17th a few more were observed along telephone wires and over the pastures, but the species remained rare until the 20th, when it suddenly became more common. A good-sized flight of several scores was noted flying southeastward by singles and couples at sunset on the 23rd, and after that date scissor-tailed flycatchers were conspicuous objects in all types of more open country.

The northward movement starts about April 1. On April 5, 1926, a flight of about 100 birds, strung out with many yards between individual members, was seen passing along the foothills near Divisadero. From April 15 to 27, 1926, numbers were seen each evening over the city of San Salvador, flying westward low over the housetops and stopping frequently to perch on flagpoles or telephone wires. Fully a hundred were seen each evening, the straggling flocks being often accompanied by other migrating species such as *Tyrannus tyrannus* and *Petrochelidon albifrons*.

***Tyrannus tyrannus* (Linnaeus). EASTERN KINGBIRD.**

Lanius tyrannus Linnaeus, Syst. Nat., ed. 10, 1, p. 94, 1758—South Carolina.

Specimens and records.—San Salvador, 6 (April 20, 1912). Also noted at San Salvador April 22, 1926.

Status.—Noted only as an abundant late April migrant at San Salvador.

Remarks.—Eastern kingbirds were seen on but two dates in spring. We found no trace of them during fall or winter, and it is probable that all, or nearly all, perform the southward migration down the Atlantic side.

On April 20, 1912, a compact flock of about 20 birds was seen flying from trees on the outskirts of San Salvador. They flew swiftly, more like waxwings than kingbirds, and were not recognized until specimens were collected. In the evening of April 22, 1912, a great, scattered flock of several hundred flew, in characteristic leisurely fashion, northwestward over the city of San Salvador. Some of them stopped momentarily on telephone wires, radio aerials, and similar perches and were positively identified, although no specimens were taken. This may have constituted the only flight of the season to pass this point, for not a single individual was seen before or after that date.

***Tyrannus verticalis* Say. ARKANSAS KINGBIRD.**

Tyrannus verticalis Say, in Long's Exped., 2, p. 60, 1823, note—near La Junta, Colorado.

Specimens and records.—Mt. Cacaguatique, 1 (December 15, 1925); San Salvador, 2 (March 14, 20, 1912); Volcán de San Miguel, 1 (March 18, 1926). Also noted at Divisadero (October 31, 1925); Volcán de San Miguel (March 11 to 19, 1926); Colima (January 20 to 27, 1927); Volcán de Santa Ana (May 8, 12, 1927).

Status.—Fairly common migrant and winter visitant in the foothills and mountains, arriving late in the fall and remaining until well along in the early summer. Extreme dates are October 31 and May 12. The limits in altitude were 800 and 7,200 feet.

Remarks.—The Arkansas kingbird was found to be not uncommon in the foothills and mountains of El Salvador between the dates given above. The first to be observed were two, flying in company, at Divisadero on October 31, 1925. They passed directly overhead, and the white outer webs of the lateral tail feathers were very conspicuous. No more were seen until December 14, 1925, when a single bird was taken in the oaks on Mt. Cacaguatique. During late January they were common on the river plain at Colima, and a goodly number were seen there daily from the 20th to the 27th. It is apparent that, as in the case of some other western forms, for example *Oporornis tolmiei*, the greater number do not arrive until midwinter. On Volcán de San Miguel in March, 1926, small numbers were seen daily, usually in small, restless flocks drifting along the upper limit of the Arid Lower Tropical woods or over the oak groves. During a fire in the oak groves at that place they were busily catching small white moths which had been forced into the air by the ground fire below. Not infrequently they also caught

fluttering white ashes by mistake. On May 8, 1927, a flight, evidently migratory in nature, was seen crossing the crater at the very summit of Volcán de Santa Ana at 7,200 feet; a few days later, on the 12th, a flock of 25 was seen flying due north through the gap between Cerro de Los Naranjos and Volcán de Santa Ana at an elevation of 4,500 feet.

***Tyrannus melancholicus chloronotus* Berlepsch. LICHTENSTEIN'S KINGBIRD.**

Tyrannus chloronotus Berlepsch, Proc. Fourth Int. Orn. Cong. (=Ornis, 14), p. 474, February, 1907—Temax, Yucatán.

Specimens and records.—Puerto del Triunfo, 4; San Salvador, 2; Lake Olomega, 3; Divisadero, 10; Rio San Miguel, 2; Barra de Santiago, 1; Lake Guija, 1; Sonsonate, 2. Also noted at Lake Channmico; Zapotitán; Colima; Volcán de Santa Ana.

Status.—Common resident of open or semiwooded country in the Arid Lower Tropical Zone. The species is most numerous on the coastal plain and in the lower foothills and only rarely straggles to an elevation of 4,500 feet.

Remarks.—El Salvador specimens average distinctly paler and more greenish on the chest and have whiter throats than typical birds from Yucatán and Costa Rica. In these respects they are, perhaps, intermediate toward *Tyrannus melancholicus occidentalis*, which ranges in typical form on the west coast of Mexico from western Oaxaca to Sonora. Otherwise they are closer to *chloronotus*, for they possess the bright yellow underparts and smaller size of that form. Bangs and Peters¹ have placed the meeting place of the two races in extreme southwestern Oaxaca. In reality, no arbitrarily fixed line can possibly do justice to the facts, for *chloronotus* blends so imperceptibly into *occidentalis* that just where the two come together seems a matter of personal opinion.

Lichtenstein's kingbirds are generally distributed over open country everywhere in the lower levels and may, locally, be very common indeed. Such places as Colima and Divisadero, where much of the terrain is tree-dotted agricultural land, are eminently suited to their needs, and they were very numerous in both localities. They are much less common in wooded areas such as Lake Olomega and Puerto del Triunfo, where their spheres of activity are necessarily limited to clearings or waterfronts. Thus, in general, these kingbirds resemble in habits their congeners of the north. The most

noticeable differences are their comparatively placid and less pugnacious natures, and the very different character of the call-notes. Instead of the sharp, raucous clatter of sounds so characteristic of the northern species, the voice of *chloronotus* is subdued and at times almost musical.

Nesting.—The nests differ greatly from the bulky, padded structures of the northern species. One found at Zapotitán on June 12, 1912, was placed six feet from the ground in the foliage of a horizontal branch of a small mimosa tree. It was so thin and so poorly constructed that the three eggs could easily be seen from below. The body was of small twigs, and the nest cup was lined with fine round grasses. Another in an almost exactly similar situation, found at Lake Guija May 28, 1927, was somewhat better built, for its contents could not be seen from below. Like many other native species this one often takes advantage of wasps' nests by placing its own home close by. A very unusual nest-building date was recorded at Divisadero. On October 13, 1925, a pair was seen working on a new, nearly finished nest, placed fifteen feet up in a small, thickly foliated tree. However, no eggs were laid and the nest was eventually abandoned.

Plumage notes.—The plumage sequences parallel those of *Tyrannus verticalis* and *Tyrannus vociferans*. At the postjuvenile body molt a body plumage like that of the adults is acquired. The juvenile wing feathers and rectrices are retained, sometimes until the annual molt of the following fall, but are usually replaced either in part or entirely during the first winter and spring. The concealed colored feathers of the crown also are delayed in their appearance until the spring molt. The annual molt commences in some birds as early as the middle of July, and in one specimen is as yet unfinished at so late a date as November 12. About August 1 to October 1 is probably the average molting period. The spring molt is extensive and includes a varying number of rectrices. It occurs in February, March, or April.

The degree of rapidity with which the dorsal plumage fades from olive-green to gray is astonishing. Just after the annual and postjuvenile molts the back is uniformly a solid, bright olive-green, but within a few weeks becomes duller and by midwinter is definitely gray. New feathers coming through at any time of the year are bright olive-green and this, contrasted with the older, gray ones, gives a mottled appearance.

Colors of soft parts.—Adults: iris, dark brown; bill, tarsi and feet, black. Juveniles: similar, but bill blackish brown.

Stomach contents.—Insects exclusively, 7; insects and berries, 2; berries exclusively, 1.

***Myiodynastes luteiventris luteiventris* Sclater. SOUTHERN
SULPHUR-BELLIED FLYCATCHER.**

Myiodynastes luteiventris Sclater, Proc. Zool. Soc. Lond., p. 42, 1859—no type loc.(=Orizaba, Vera Cruz, Mexico); Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 48, 1889—part, La Unión.

Myiodynastes luteiventris luteiventris van Rossem, Condor, 29, p. 126, 1927—San Salvador, Volcán de San Salvador, Sitio del Niño (=Lake Chanmico), Lake Olomega, Volcán de San Miguel.

Specimens and records.—Volcán de San Miguel, 1 (March 12, 1926); Barra de Santiago, 2 (April 6, 10, 1927); San Salvador, 4 (April 9, 18, 20, 25, 1912); Lake Olomega, 10 (July 28, 30, August 13, 15, 16, 1925; April 7, 10, 12, 1926); Chilata, 6 (April 22, 23, 25, 1927); Lake Chanmico, 1 (May 14, 1912); Volcán de Santa Ana, 1 (May 15, 1927); Lake Guija, 1 (May 23, 1927); Miraflores, 1 (June 5, 1927); Volcán de San Salvador, 1 (May 30, 1912). Also noted at Barra de Santiago (April 3, 1927). Recorded from La Unión; San Salvador; Volcán de San Salvador; Lake Chanmico; Lake Olomega.

Status.—Common summer visitant to all wooded areas in the Arid Lower Tropical Zone. Under exceptional circumstances it extends, locally, upward to 4,500 feet, but is normally to be found below 3,000 feet. Extreme dates of arrival and departure are March 12 and August 16.

Remarks.—The fact that this species is migratory and entirely absent from El Salvador during the winter months was a very surprising discovery. The northern race *Myiodynastes luteiventris swarthi* is, of course, well known to be only a summer visitant in the mountains of Arizona and northern Mexico. Grayson¹ found the species migratory in Sinaloa and Jalisco, and present in those localities only during the summer months, but so far as Mexican or Central American records are concerned he seems to have been the only person to stress this fact. There appear to be no Mexican or Central American records for the months of November, December, January, and February, and where the birds are at that time is a question. Possibly the several records from Colombia, Ecuador, Bolivia, and Peru afford an answer, since the only dates which have

¹ Mem. Bost. Soc. Nat. Hist., 2, p. 287, 1874.

been published in connection with these southern points are from October 4 to March 14.¹

While March 12 probably is an average date for the early arrivals of the sulphur-bellied flycatcher in El Salvador, the main wave does not appear before the first week in April. A great many more birds are in evidence during the early part of that month than are present as breeders in May and June and, therefore, the excess undoubtedly are transients, bound for more northern points. As for dates of departure, the birds were very common about Lake Olomega until the middle of August. No specimens were taken nor notes made of the species after the 16th of that month, but it is inconceivable that such a date represents final departure. Bangs and Peters² record specimens from extreme southwestern Oaxaca as late as October.

Not one specimen of the entire series of twenty-five can be identified with the Arizona race *swarthy*, although the taking of an occasional specimen of that form was to be expected.

In habits these flycatchers resemble becards far more than they do flycatchers, a fact already mentioned by Bangs and Barbour³ who suggest that the genus *Myiodynastes* really belongs with the *Cotingidae*. In this we believe them to be mistaken, for examination of osteological material shows *Myiodynastes* to be not distantly related to *Tyrannus*. The majority of flycatchers occurring in Central America are voracious fruit and berry eaters; the fact that *Myiodynastes luteiventris* is particularly notable in this regard is interesting, but scarcely to be considered as grounds for considering the species a cotinga. Many examples have the face and vent so stained with fruit juice as to make them undesirable for preservation as skins.

Nesting.—On arrival the birds are paired and ready to breed. A female taken at Chilata on April 22, 1927, was laying. The nest was about ten feet from the ground in a natural cavity of a small shade tree in a coffee grove, but it was not feasible to investigate it. Another female, taken at Lake Guija May 23, 1927, evidently had

¹ Taczanowski, Proc. Zool. Soc. Lond., p. 21, 1882; Chapman, Bull. Amer. Mus. Nat. Hist., 36, p. 463, 1917; Zimmer, Field Mus. Nat. Hist., Zool. Ser., 17, no. 7, p. 372, 1930. Since the foregoing was written, Zimmer (Amer. Mus. Novit., 693, Nov. 18, 1937) obviously has provided most of the answers. He recognizes the northwestern race, but decides that *vicinior* of Cory, based on a juvenile taken in Perú in winter, has priority over *swarthy*. I have examined the type of *vicinior* and, for various reasons, do not associate it with *swarthy*.

² Bull. Mus. Comp. Zool., 68, no. 8, p. 394, 1928.

³ Bull. Mus. Comp. Zool., 65, no. 6, p. 219, 1922.

a nest in one of the numerous cavities in a small grove of trees on the lake shore, but it could not be found. The oviduct of this bird held an egg ready for extrusion. This egg seems to be fully colored. It is creamy buff, thickly spotted with dots and shell markings of reddish brown, dull purple, and lilac, and measures 25.5×19. At Miraflores on June 5, 1927, a pair was seen feeding young which were crowding about the entrance of a small cavity in a dead branch some fifteen feet from the ground.

Plumage notes.—A juvenile and an adult taken, respectively, July 28 and 30, have just started the body molt. In two adults taken August 15 and 16 the body molt is virtually complete, but curiously enough neither in these, nor for that matter in any of the six molting specimens, have any of the old, worn remiges or rectrices been replaced. It seems likely that *Myiodynastes*, like certain other migratory flycatchers (see *Empidonax*), has a midwinter wing and tail molt which occurs months after the new, fall, body plumage has been acquired.

Colors of soft parts.—Adults and juveniles alike: iris, dark brown; bill, blackish brown, fading to flesh color on mandibular rami; tarsi and feet, plumbeous.

Stomach contents.—Insects exclusively, 1; moths and small berries, 1. Many birds are stained with the purple juice of an undetermined fruit or berry.

Megarhynchus pitangua mexicanus (Lafresnaye). BOAT-BILLED FLYCATCHER.

Scaphorhynchus mexicanus Lafresnaye, Rev. et Mag. de Zool., 3, p. 473, October, 1851—Mexico.

Megarhynchus pitangua mexicanus van Rossem, Condor, 16, p. 13, January, 1914—Salvador.

Specimens and records.—Mt. Cacagualique, 4; Rio San Miguel, 1; Sonsonate, 1; Monte Mayor, 1; Volcán de Conchagua, 1; Lake Olomega, 2; Lake Guija, 1; San Salvador, 4. Also noted at Lake Channmico; Puerto del Triunfo. Recorded from "Salvador."

Status.—Fairly common resident throughout the Arid Lower Tropical Zone. There seems to be no preference for any particular altitude, for the species is generally distributed in wooded areas from sea level to 3,500 feet.

Remarks.—El Salvador specimens average slightly paler yellow below, have less intensely black (slightly grayish) crowns and more grayish (less greenish) olive upperparts than do birds from the east

coast of Central America. In this respect they are probably slightly intermediate toward the west-Mexican form, *Megarynchus pitangua caniceps*. An analagous tendency has been noted in the case of *Tyrannus chloronotus*.

The lack of rufous edgings on the wings at once distinguishes the boat-billed flycatcher in life from the otherwise very similarly colored Derby flycatcher. The two species range together in all manner of woodland over the coastal plain, in the intensively cultivated foothills, and even in the mangroves along salt water. There seems to be no definite population center, for boat-bills were fully as numerous at the upper limits of the Arid Lower Tropical on Mt. Cacaguatique and Volcán de Conchagua as in the lower country. As with so many other nonmigratory species, pairs are the rule throughout the year. In habits boat-billed flycatchers are rather sluggish. The large bill imparts a clumsy, heavy appearance and, except for coloration, the bird has little of the vivid personality of *pitangus*.

Nesting.—Two nests of this species were found. In all respects they were so different from several published descriptions as to lead to the suspicion that in some cases there has been confusion of identity and that the nests described were not those of boat-bills at all, but simply those of Derby flycatchers.

The first nest was found at San Salvador March 30, 1912, at which time it contained one egg. It was collected with the full set of three eggs on April 2. The nest itself was placed in a clump of mistletoe about 30 feet from the ground, in a leafless tree growing in a small grove of coffee. In general it was about the size and shape of the nests of the common northern species of kingbirds but instead of being composed of soft material the body was of vine tendrils, weed stems, and twigs from the coffee bushes. It was lined with fine grass, rootlets, and dead needles from some pine trees which grew about three hundred yards away. The measurements were 8×8 inches outside; depth, 4½ inches outside; nest cup, 3×4 inches across the rim and 1½ inches deep. The eggs, along with all others taken in 1912, were disposed of by Mr. Howell to unknown collections and are therefore not available for detailed description. They were described in field notes as "like heavily marked eggs of the black-headed grosbeak" except that the ground color was noted as "light cream." The second nest was found at San Salvador April 9, 1912. It was placed fifteen feet from the ground in a thinly foliated tree standing in an old, weed-grown field and contained

three eggs with incubation about two-thirds advanced. The eggs were similar to the first set. The nest was $6\frac{1}{2} \times 7\frac{1}{2}$ inches outside; depth, $3\frac{1}{2}$ inches; nest cup, $2\frac{1}{2} \times 3$ inches across the rim and $1\frac{1}{2}$ inch deep. It was made entirely of curly, twisted rootlets and some weed stems, the finer of both of these materials being used for lining. There can be no doubt as to identity in either case. The first nest was discovered when a thrown stick flushed one of the parents, and one of the birds was on the nest when the set (and parent) was collected. At the second nest the female was collected when she flew from the nest to a nearby tree.

Plumage notes.—The dorsal coloration of this species changes from greenish olive to olive-gray almost as rapidly as does that of *Tyrannus melancholicus*. The color of the more or less concealed crown patch is not dependent on sex, for both males and females vary, in the series at hand, from "lemon yellow" to dull "tawny." It seems doubtful that age is responsible, for a molting specimen taken July 30 has both the old and the new crown feathers of the same "flame-orange" hue. It is certain that season plays no part, for color variation is observable at all times of the year. The two phases of head coloration appear, therefore, to be purely individual. Intermediate colors are far less common than the yellow and the tawny extremes. Although Ridgway describes the sexes as "alike," the females have the crown patch *very much* more restricted in extent. In that sex it is only about 15 mm. long whereas in the males it is about 25 mm.

There is not at hand the proper material to judge as to molt sequences. The annual molt occurs in July, August, and September. Specimens taken in spring show a very extensive body molt in February, March, and April.

Colors of soft parts.—Adults: iris, dark brown; bill, tarsi, and feet, black. Juvenile male: similar, but tarsi and feet horn color.

Stomach contents.—Insects exclusively, 2.

***Myiozetetes similis superciliosus*¹ (Bonaparte). GIRAUD'S
FLYCATCHER.**

Tyrannus superciliosus "Swains." Bonaparte, Proc. Zool. Soc. Lond., p. 118, 1837 (1838)—Mexico.

Myiozetetes tezensis tezensis van Rossem, Condor, 16, p. 11, January, 1914—Salvador.

¹Zimmer (Amer. Mus. Novit., 963, p. 20, in text, Nov. 18, 1937) believes that *tezensis* Giraud is a better name than *superciliosus* of Bonaparte. We believe that Nelson and Peters (sup. cit.) present the better case.

Specimens and records.—Lake Olomega, 5; Colinas de Jucurán, 1; San Salvador, 5; Divisadero, 2; Volcán de San Miguel, 1; Puerto del Triunfo, 2; Sonsonate, 1; Lake Guija, 1. Also noted at Lake Chanicó; Volcán de San Salvador; San Sebastián; Río San Miguel; Colima; Barra de Santiago; Chilata; Volcán de Santa Ana. Recorded from "Salvador."

Status.—Common resident of the Arid Lower Tropical Zone. Although generally distributed from sea level to 2,500 feet, it is rare above the latter altitude, and only locally does it reach as high as 4,500 feet.

Remarks.—Giraud's flycatchers are, like the similarly colored Derby and boat-billed flycatchers, primarily birds of clearings and semiwooded areas. The growth along water courses and lakes is especially favored, and pairs may be found every few hundred yards in such places. Occasionally, as along the Acelhuate River in the suburbs of San Salvador, the population was even more closely spaced, even to intervals of fifty yards. At Puerto del Triunfo it was not uncommon to encounter birds in the heavy forest, where they lived in the comparatively open levels between the coyol-palm undergrowth and the thick, crown foliage.

These birds are almost as active as the Derby flycatchers, and any suspicious objects or sounds near the nests are sure to be the cause of a lot of excitement on the part of the parents. When the bird is angry or alarmed, the crest is raised to the full. Normally the crown feathers are not carried flat on the head, but are slightly elevated and make the head appear "bushy." Most of the resident flycatchers, that is, the permanent residents, are in pairs throughout the year and probably remain so for the duration of their lives, within a very limited area. This must be true, particularly with the more common species such as the present one, for intrusion of outsiders into the domains of established pairs is bitterly fought, and it is not likely that sites, once acquired, are voluntarily relinquished.

Nesting.—The nests are large, purse-shaped affairs, loosely constructed of grass, rag strips, plant-down, and, in fact, almost any soft, bulky material. This mass is firmly packed down into a crotch or into a mass of small twigs or branches. An average nest is about seven or eight inches high and five inches in diameter outside, with the nest cavity, of course, very much smaller. The entrance is on the side, usually nearer to the top than to the center, and well protected by the overhanging, rounded dome. The usual site is near

the tip of a long drooping branch over water, too high to be reached from below and, unless one cuts off the branch near the trunk, inaccessible from any side. One of the slender mimosa trees (*Acacia cornigera*) locally known as "iscanal" is especially common along streams and is preferred to all other trees for nesting places. The numerous, heavy, curved thorns of these trees are invariably hollowed out and inhabited by swarms of small but extremely hostile antlike insects, so that altogether it can be seen that Giraud's flycatcher nests in well-protected situations.

The enmity toward poaching members of its own species is not displayed toward other birds. In fact there are often to be found literal colonies of various species, nesting together in the same tree for no apparent reason other than that of sociability. An extreme example of this was observed at Lake Guija, where in one small "iscanal," scarcely more than a large bush, was one nest each of the spotted-breasted oriole, Lichtenstein's oriole, Lichtenstein's kingbird, Derby flycatcher, Giraud's flycatcher, cactus wren, and rufous ground dove. Within twenty feet or less of these nests, though in other trees, were two nests of the gray becard, and one each of tody flycatcher, short-legged wood pewee, and Sclater's oriole. To be sure there were two large wasps' nests in the "iscanal" bush, but for that matter there were plenty of other nearby trees or bushes holding wasps' nests which were vacant so far as birds' nests were concerned. It may be added that all the nests mentioned were occupied at the time the list was made.

Nesting commences in early April and continues on through May and probably into June. The earliest record of activity was on April 5, 1926, when several nests, apparently completed, were observed at intervals along the road between San Miguel and Divisadero. About a dozen nests noted along the Acelhuate at San Salvador on April 10, 1912, were in various stages of construction, and one of them held four fresh eggs on the 17th. A nest examined at Chilata on April 28, 1927, held four eggs on the point of hatching, and at Lake Guija many nests were observed between May 23 and 31, 1927. From some of these the parents were flushed, and most of them probably contained eggs. One, however, on May 24 contained several clamorous, half-grown young.

Plumage notes.—Two juveniles taken July 30 and August 5 are, respectively, just commencing and just finishing the postjuvenile molt. In both of these the postjuvenile portions of the plumage are identical in color with the adult plumage. After this molt is

completed there seem to be no differences between adults and birds of the year. The juvenal wing and tail feathers are, in this species, replaced at the postjuvénal molt—a sequence which is at marked variance with some of the species of *Tyrannus*, *Myiodynastes*, *Empidonax*, and others. The annual molt takes place rather earlier than usual. It commences early in July and is finished as to contour plumage in one specimen taken July 22. Another bird taken August 13 is in complete, new plumage. The limited, spring molt involves only a few feather renewals on the body, principally on the back, head, and chest.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; bill, tarsi, and feet, black.

Stomach contents.—Small berries exclusively, 2; berries and insects, 2.

***Pitangus sulphuratus guatemalensis* (Lafresnaye). CENTRAL AMERICAN DERBY FLYCATCHER. CHIO. BIEN-TE-VEO.**

Saurophagus guatemalensis Lafresnaye, Rev. et Mag. Zool., p. 462, 1852—Guatemala.

Pitangus sulphuratus derbianus Ridgway (not *Saurophagus derbianus* Kaup), Bull. U. S. Nat. Mus., 50, pt. 4, p. 672, 1907—part, San Salvador; van Rossem, Condor, 16, p. 11, January, 1914—Volcán de San Salvador; San Salvador; Santa Ana; Acajutla; Lake Chanmico; Lake Ilopango (habits).

Specimens and records.—Lake Olomega, 5; San Salvador, 4; Lake Chanmico, 1; Sonsonate, 2; Barra de Santiago, 1; Puerto del Triunfo, 2. Also noted at Volcán de San Salvador; San Sebastián; Santa Ana; Acajutla; Divisadero; Rio Goascorán; Ciudad Barrios; Rio San Miguel; Volcán de San Miguel; San Miguel; Colima; San José de Sacare; Chilata; Lake Guija; Lake Ilopango.

Status.—Extremely common resident throughout the Arid Lower Tropical Zone and distributed less numerously, though regularly, to 4,500 feet wherever cultivation has cleared the land. The center of abundance is along watercourses and lakes on the coastal plain and up to about 2,500 feet in the foothills. Under very favorable conditions the species may reach an altitude of nearly 7,000 feet.

Remarks.—We fully endorse recognition of two forms of the Derby flycatcher in Mexico and Central America. The difference between *derbianus* of western and northern Mexico and *guatemalensis* of southern Mexico and Central America is almost entirely a matter of the paler coloration of the former. However, it is so notice-

able and constant that it is strange that Peters¹ seems to have been the first of modern ornithologists formerly to advocate the recognition of *guatemalensis*.²

The Derby flycatcher seemingly has but one requirement—that of open or semiopen country. Otherwise it is one of the most versatile of birds, adapting itself to almost any conceivable environment. A summary of published popular and semipopular accounts tends to leave one with the impression that this is pre-eminently a bird of tidewater, where it lives on small fish. This is most emphatically not the case in general, but may be true of regions of heavy forest where tidewater offers the only available hunting ground. Typically these flycatchers inhabit much the same type of country as do kingbirds, that is, districts given over to agriculture. In El Salvador most of the hill region from the level of the coastal plain to about 2,500 feet has been cleared of timber and is checkerboarded into countless small fields, divided off by rows of trees and cut in every direction by steep-walled ravines. It is the center of human population and the center of the Derby flycatcher population as well. On the south slope of the volcano of San Salvador the land has been cleared in places nearly to the summit and there, to an elevation of about 7,000 feet, Derby flycatchers have worked their way in small numbers. On the coastal plain they do not occur in deep jungle. However, all cleared land is well populated by them, and along the borders of lowland rivers and lakes and about the mangrove lagoons they are exceedingly common also. Large cities as well as small towns and farms are invaded in numbers, and every plaza in which there are trees of any size is sure to have its pair or more of Derbys.

By nature Derby flycatchers are nervous, highly irritable, and continually engaged in some sort of activity. A summary of their urban activities is taken from van Rossem's previously published account. "A favorite lookout is a tall flagpole or similar point of vantage, and this is taken possession of to the exclusion of all other birds, most especially of their own kind; in fact, the advent of another pair on their preserve is the signal for a battle royal which generally ends as it should—in favor of the home team. From dawn till an hour or so after sunrise and in the cool of the late afternoon

¹ Bull. Mus. Comp. Zool., 69, p. 448, October, 1929.

² Since the preceding paragraphs were written, van Rossem (Proc. Biol. Soc. Wash., 50, p. 25, 1937), has named a northwestern Mexican race as *Pitangus sulfuratus palliatus*, which, however, Zimmer (Amer. Mus. Novit., 963, p. 26, in text, Nov. 18, 1937) is unable to recognize.

and early evening they are most active and noisy. Their call-notes can then be heard in every quarter of the city and the birds themselves are most in evidence, snatching flies over heaps of refuse in the gutters, hawking about the plazas, or 'kingbirding' an unlucky black vulture. Activity, though, is by no means confined to these periods. On two occasions one (probably the same individual) was seen about an arc-light long after dark. Because the light was quite high up I could not actually see the bird catch anything, though its frequent short and erratic flights would indicate that [insect catching] was the object. In the city of San Salvador are a great many birds which are without doubt nonbreeders, even though they are mostly in pairs. These individuals, having nothing better to do, contrive to keep things lively by scrapping not only with each other, but with anything that happens to attract their attention, such as a stray house cat or a wandering hawk."

Of local names there are several, all based on the great variety of call-notes. Some of them are "Bien-te-veo," "Dichoso-fu!" (sometimes interpreted as "Kiss-ka-dee"), and "Chio."

Nesting.—Such a wide variety of sites is chosen for the bulky nests that to designate any one as typical would be misleading. "Typical" sites about towns and farms are cocoanut trees, the height at which the nests are placed averaging about twenty feet; but extremes of six feet and fifty feet were noticed. In the lower country where various thorny trees are common along watercourses, a frequent site is in a maze of thorns ten or twelve feet up, usually within a few feet of, or even placed directly on, a wasp's nest. In marshes or lakes the crotch of a dead tree is used probably more often than any other situation. Vine tangles and clumps of parasitic growth are also occupied.

The nest is a large structure resembling an oversized nest of the cactus wren. It is built chiefly of dead grass and any other soft material at hand, such as rags, plant fiber, and feathers; the cup in the interior is rather shallow and of well-packed and smoothed-down grass stems. A nest collected at San Salvador on March 28, 1912, measured 18 inches long by 10 inches wide by 8 inches high. The cavity was 7 inches long by 5 inches wide and 5 inches high, the shallow nest cup itself taking up the entire floor. The entrance was on the side and pointed slightly downward to prevent rain from beating directly into the nest chamber. Most nests are a little more round (less purse-shaped) than this one, but all are very similar in type. Two, three, or (usually) four eggs constitute the set.

Although nest building begins in late February, the earliest date for eggs is March 28. As eggs may be found until June 1, it is probable that two broods each year are raised.

The habit of nesting in small communities made up of different species has been noted under the account of Giraud's flycatcher. *Pitangus sulphuratus* is very commonly a member of such assemblages, living in perfect amity in close proximity to such closely allied forms as Lichtenstein's kingbird and Giraud's flycatcher, but tolerating no intrusion on the part of its own species.

Plumage notes.—The postjuvenile molt of this species results in a contour plumage very similar to, or seemingly identical with, the adult plumage. However, the juvenile rectrices and remiges are normally carried a full year, just as in *Tyrannus*. In this respect, at least, there is nothing in common with *Myiozetetes*, which loses these feathers at the postjuvenile molt. There are at hand four specimens collected January 23, February 27, March 6, and April 1, which still retain the old, juvenile, flight feathers, and this condition seems to be the normal one. The spring molt is limited to a few contour feathers. The annual molt commences about August 1 and is complete by the middle of September or the first of October.

Colors of soft parts.—Adults and juveniles alike: iris, dark brown; bill, tarsi, and feet, black.

Stomach contents.—Insects exclusively, 2. Stomachs of four birds taken at San Salvador in 1912 contained small beetles, wasps, and small grasshoppers in relative abundance in the order named, and, in addition, a mass of smaller-winged insects. At Puerto del Triunfo many birds were seen perched on mangrove roots over the water, sitting motionless and in their attitudes resembling kingfishers. In striking the water, however, they do not make the clean-cut dive of a kingfisher, but after hovering an instant make a head-long splash. The objects of the dives seemed to be tiny fish. This was certainly so in one case and by inference in others. This species is one of the very few larger flycatchers which appears never to take fruit or berries.

***Myiarchus crinitus boreus* Bangs. NORTHERN CRESTED FLYCATCHER.**

Myiarchus crinitus boreus Bangs, Auk, 15, p. 179, 1898—Scituate, Massachusetts.

Specimens and records.—Rio Goascorán, 2 (October 25, 1925); Rio San Miguel, 5 (February 2 to 20, 1926); Volcán de Conchagua, 1

(February 25, 1926); Barra de Santiago, 1 (April 9, 1927); Lake Ilopango, 1 (April 13, 1912). Also noted at Divisadero (March 28, 1926).

Status.—Fairly common in fall, winter, and spring on the coastal plain and in the foothills and mountains up to 3,500 feet. The species is most numerous in open woods in the lower foothills and is least so along the coast. Extreme dates of arrival and departure are October 25 and April 13.

Remarks.—All of the eastern crested flycatchers taken are of the northern race, for which we tentatively employ the name *boreus*. There seems to be some difference of opinion as to the status of birds from South Carolina, the type locality of Linnaeus' *Turdus crinitus*. Until the matter is finally settled, it appears preferable to emphasize the northern character of birds wintering in El Salvador.

Crested flycatchers were first observed in the thin woods along a small stream at Rio Goascorán on October 25, 1925. At Rio San Miguel and Divisadero they were not uncommon in more open second growth. On Volcán de Conchagua several were observed during the latter part of February, 1926, as high as 3,300 feet in the shade of the coffee trees, but they were not present in the pines a few hundred feet higher. The single record for the seacoast was collected at Barra de Santiago, where the bird was taken in the thin scrub along the beach. None was ever seen either in the mangroves or in heavy forest anywhere.

Plumage notes.—On arrival from the north the adults are in fresh plumage and have fully completed the annual molt. The only immature bird collected (April 18) has retained its juvenal remiges and rectrices from the previous year. It is renewing the 7th primary in each wing, in addition to an extensive renewal of the contour plumage. The retention in this single specimen of the juvenal wing and tail feathers is probably an abnormality, for the other species of *Myiarchus* which occur locally change these at the postjuvenal molt.

***Myiarchus cinerascens cinerascens* (Lawrence). ASH-THROATED FLYCATCHER.**

Tyrannula cinerascens Lawrence, Ann. Lyc. Nat. Hist. New York, 5, p. 121, 1851—Between San Antonio and the Rio Grande, western Texas.

Specimens collected.—None.

Status.—Known only from a single specimen collected at La Libertad by W. B. Richardson on February 25, 1891. This skin is

now in the British Museum where it was examined by van Rossem in September, 1933.

***Myiarchus cinerascens flavidior* van Rossem. YELLOWISH ASH-THROATED FLYCATCHER.**

Myiarchus cinerascens flavidior van Rossem, Trans. San Diego Soc. Nat. Hist. 8, No. 16, p. 116, March 12, 1936—Lake Olomega, Dept. San Miguel, El Salvador.

Myiarchus cinerascens nuttingi van Rossem (not *Myiarchus nuttingi* Ridgway), *ibid.*, No. 19, p. 261, in text, Apr., 1930—El Salvador (crit.).

Specimens collected.—Lake Olomega, 5; Rio San Miguel, 1; Rio Goascorán, 1; Divisadero, 2; Sonsonate, 1; Lake Channmico, 1; Lake Guija, 1; Barra de Santiago, 1.

Status.—Fairly common resident, below 1,500 feet, throughout the Arid Tropical Zone.

Remarks.—The characters shown by *flavidior*, which ranges to western Guatemala, are on the whole nearest to *Myiarchus cinerascens inquietus* of western Mexico. However, *flavidior* is decidedly brighter ventrally, more olivaceous dorsally, and it is also smaller. True *nuttingi* is evidently confined to Costa Rica and southwestern Nicaragua and thus accords with the geographic behavior of many other species and subspecies.

The junior author has read with extreme interest the remarks of Ludlow Griscom¹ concerning *inquietus* and *nuttingi*, especially his able comments on the peculiarities of western Guatemala "*nuttingi*" (now *flavidior*). Although we do not agree with several of his conclusions, we believe his comments should be read by anyone interested in the geographic variations of *Myiarchus cinerascens* and its races.

This flycatcher is decidedly averse to deep woods and is more likely to be encountered in sunny, open, second growth or in bush-dotted pasture lands. The mimosa thickets about Lake Olomega, Lake Guija, and Divisadero were especially favored, and in those localities this species was more common than elsewhere. However, it was never numerous, and the sight of more than two or three individuals a week was an exceptional circumstance.

In marked contrast to *Myiarchus tuberculifer connectens*, the present species is solitary except during the breeding season. From *connectens*, the only other local *Myiarchus* of similar size, it is readily distinguishable in the field by the heavier and more stolid appearance as well as by the obvious color differences.

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 253, 1932.

Nesting.—The breeding season commences about the middle of April and continues through May, if one can judge from the condition of specimens taken in those months. Pairing takes place from the middle of March.

Colors of soft parts.—Adults, sexes alike: iris, coffee-brown; bill, tarsi, and feet, brownish black, rami of mandible paler.

Stomach contents.—Small insects, 1; small caterpillars, 1; berry seeds and insects, 1; berry seeds exclusively, 1.

***Myiarchus tyrannulus brachyurus* Ridgway. CENTRAL
AMERICAN CRESTED FLYCATCHER.**

M[yiarchus] brachyurus Ridgway, Man. N. Am. Birds, p. 334, 1887—Ometepe, Nicaragua.

Specimens collected.—Lake Olomega, 3 (August 10, 16, September 3, 1925); Puerto del Triunfo, 3 (January 14, 24, 1926); Rio San Miguel, 1 (February 17, 1926); Barra de Santiago, 5 (April 3 to 10, 1927).

Status.—Fairly common resident in the mangrove belt coastwise. Occurs inland, in fall and winter at least, at low elevations on the coastal plain.

Remarks.—The former uncertainty regarding the relationships of *brachyurus* is cleared up by the characters shown by the El Salvador series, and there would now seem to be little doubt that it is simply a geographic form of *tyrannulus*. Two distinct steps in the transition are shown even within the narrow limits of El Salvador. The three birds from Puerto del Triunfo are colored just like typical *brachyurus* from northwestern Costa Rica, but in size are just about intermediate between that form and *Myiarchus tyrannulus nelsoni*. Five from Barra de Santiago are indistinguishable from *brachyurus* dorsally and from *nelsoni* ventrally, while in measurements and tail characters they are intermediate. The three Lake Olomega specimens are not in the best of plumage, but they seem to be closer to the Barra de Santiago series. The single specimen from Rio San Miguel is like the Puerto del Triunfo trio. However, these last named interior skins, while interesting, are not of vital importance and are of value chiefly in indicating a dispersal inland during the fall and winter. The two lots from the mangrove localities are the critical ones, for they were very probably resident (the Barra de Santiago birds certainly so) in the lagoons where they were collected.

Thanks to the authorities of the United States National Museum we have been able to examine the type of *Myiarchus brachyurus*

(from Ometepe, Nicaragua) and find it to be identical with specimens from northwestern Costa Rica. The measurements of the El Salvador series compare with those of *brachyurus* and *nelsoni* as follows:

	Wing	Tail	Culmen from base
5 male <i>brachyurus</i> —Nicaragua and Costa Rica	91.8	84.1	24.9
3 male <i>brachyurus</i> —El Salvador	98.6	90.7	25.3
10 male <i>nelsoni</i> —Texas and eastern Mexico	103.1	94.2	27.3
2 female <i>brachyurus</i> —Costa Rica	89.5	78.5	23.9
5 female <i>brachyurus</i> —El Salvador	94.2	84.8	24.8
6 female <i>nelsoni</i> —Eastern Mexico	100.2	89.6	26.1

From the present evidence we feel safe in saying that this resident subspecies is confined during the breeding season to the mangroves, for no trace of it was found inland except during the fall and winter. In the mangroves a good many more individuals were seen than were collected. As anyone who has worked in such a locality well knows, it is almost useless to shoot small birds except at extreme high or extreme low water, for otherwise the fallen birds will be swept out of sight among the maze of roots before they can be recovered.

Nesting.—At Barra de Santiago in early April, 1927, nesting sites had been selected and were being guarded by their future tenants. The males of such mated pairs were in full breeding condition, although the ova of the females were, at the largest, only about 2 mm. in diameter.

***Myiarchus tyrannulus nelsoni* Ridgway. MEXICAN CRESTED
FLYCATCHER.**

Myiarchus magister nelsoni Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 903, 1907—Alta Mira, Tamaulipas, Mexico; A. O. U. Check-List, ed. 3, p. 211, 1910—Salvador.

M[yiarchus] mexicanus Ridgway (not *Tyrannula mexicana* Kaup), Man. N. A. Birds, p. 333, 1887—Salvador.

Myiarchus mexicanus mexicanus Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 621, 1907—Acajutla.

Myiarchus tyrannulus nelsoni Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 162, 1927—Salvador; A. O. U. Check-list, ed. 4, p. 205, 1931—Salvador.

Specimens and records.—Rio Goascorán, 1 (October 28, 1925); Puerto del Triunfo, 1 (January 24, 1926); Rio San Miguel, 4 (February 2, 11, 12, 1926); Barra de Santiago, 1 (April 6, 1927). Recorded from Acajutla.

Status.—Uncommon in fall, winter, and spring along the seacoast and on the coastal plain. Extreme dates of arrival and departure are October 28 and April 6.

Remarks.—The Mexican crested flycatcher is far less common than the resident *brachyurus*, and the specimens taken were all that came under notice. While skins of the two forms often appear to be of very much the same size, *nelsoni* is, in life, decidedly the larger of the two.

The above seven skins are unmistakably of this race and differ from *brachyurus* in somewhat larger size, particularly of bill, more greenish or brownish (less grayish) dorsal coloration and brighter yellow underparts.

The Acajutla record is assigned here in default of examination of the specimen. It may be *brachyurus*.

***Myiarchus tuberculifer connectens* Miller and Griscom. DUSKY-HEADED CRESTED FLYCATCHER.**

Myiarchus lawrenceii connectens Miller and Griscom, Amer. Mus. Novit., 159, p. 6, February 16, 1925—Las Cañas, Matagalpa, Nicaragua.

Myiarchus tuberculifer connectens Peters, Bull. Mus. Comp. Zool. 69, p. 451, October, 1929—Salvador (crit.).

Myiarchus lawrencei Brewster (not *Muscicapa lawrencei* Giraud), Bull. Nutt. Orn. Club, 6, p. 252, October, 1881—part, Salvador.

[*Myiarchus tristis*] var. *lawrencei* Baird, Brewer and Ridgway, Hist. N. A. Birds, 2, p. 333, 1874—part, Salvador.

Myiarchus lawrenceii lawrenceii Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 642, 1907—part, La Unión?

Myiarchus lawrenceii Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 94, 1889—part, La Unión.

Myiarchus lawrenceii querulus Ridgway (not of Nelson), Bull. U. S. Nat. Mus., 50, pt. 4, p. 647, 1907—part, "La Unión, March 14."

Specimens and records.—Mt. Cacaguatique, 7; Puerto del Triunfo, 4; Chilata, 3; Lake Olomega, 14; Lake Channico, 1; San Salvador, 4; Volcán de San Miguel, 2; Divisadero, 2; Volcán de Santa Ana, 1; Monte Mayor, 1; San José del Sacare, 1; Barra de Santiago, 2. Also noted at Volcán de San Salvador; San Sebastián; Rio San Miguel; Volcán de Conchagua; Colima. Recorded from La Unión.

Status.—Exceedingly common resident of the Arid Lower Tropical Zone; less commonly, and locally, a resident of both Arid Tropical Zones to an altitude of at least 5,000 feet.

Remarks.—Specimens from El Salvador are, as was to be expected, typical of the Central American race. Though the only character distinguishing this form from *Myiarchus tuberculifer lawrenceii* (Giraud) is that of decidedly smaller size, the distinction seems to be constant, and we have no difficulty in recognizing it on that basis alone.

Through the courtesy of the officials of the United States National Museum we have been able to examine the specimen recorded from La Unión by Ridgway as *Myiarchus lawrencei querulus*. This specimen, No. 29,424, U. S. National Museum, collected at La Unión, March 14, 1863, by Captain J. M. Dow, is typical in measurements of the local resident race. It is very much too small for *querulus*, and doubtless is simply a faded example of *connectens*. The measurements (sex unknown but probably female) are: wing, 75; tail, 69.

This commonest of the local forms of *Myiarchus* probably outnumbered many times all the others combined. It is to be encountered everywhere in the Arid Lower Tropical Zone wherever there is any timber; even the thin lines of shrubs or trees dividing off the squares of fields and pastures are sure to hold a pair at least for every few hundred feet. The densest parts of the swamp forest are, likewise, well populated. In the hill forests the range extends up through the Arid Lower Tropical into the pines and oaks and even into the humid, cloud forests for a short distance. Toward the higher elevations the birds become markedly scarcer, but from 4,000 feet down to sea level the numbers seem to be pretty constant and affected chiefly by the relative abundance of forest.

Pairs are the almost invariable rule throughout the year, and they appear to be strictly resident within limited localities.

Nesting.—Examination of specimens taken showed that nesting begins about the middle of March and continues up to at least June 1.

Plumage notes.—The annual molt commences late in July and is usually complete by September 1. The tail molt in this species seems to be very regular. The center pair of rectrices is dropped first, followed in order by the lateral pairs, the outer pair being the last to be shed. The postjuvenile molt is a complete one, and when finished there appears to be nothing to distinguish adults from young of the year, for the juvenile remiges and rectrices are lost with the rest of the juvenile plumage. This is true of all species of *Myiarchus* of which we have examined enough specimens to come to definite conclusions. Many specimens taken during late winter and spring fail to reveal any evidence of a spring molt other than a few scattered body feathers.

Colors of soft parts.—Juveniles and adults alike: iris, dark brown; bill, tarsi, and feet, blackish brown or brownish black.

Stomach contents.—Small insects exclusively, 10. Contrast this with the omnivorous diet of *nuttingi*, the latter a much less "successful" species both in relative numbers and in range occupied.

Nuttallornis borealis cooperi (Nuttall). EASTERN OLIVE-SIDED FLYCATCHER.

Muscicapa cooperi Nuttall, Man. Orn. U. S. and Canada, 1, p. 282, 1832—Sweet Auburn (= Mount Auburn, near Boston, Massachusetts).

Specimens collected.—San Salvador, 1 (April 24, 1912); Lake Olomega, 1 (August 28, 1925).

Status.—Rare spring and fall migrant through the Arid Lower Tropical Zone.

Remarks.—On no other dates were olive-sided flycatchers observed, and it seems probable that comparatively few individuals stray to the Pacific slope during the migrations.

Although there seems to be a marked reluctance on the part of many ornithologists to recognize two races of the olive-sided flycatcher, eastern and western birds appear to us to be easily separable on the basis of size. Swainson's type of *Tyrannus borealis* (examined by van Rossem) belongs to the larger race of the west, as was suspected by Oberholser¹ on geographic grounds.

Myiochanes virens richardsonii (Swainson). WESTERN WOOD PEWEE.

Tyrannula richardsonii Swainson, Fauna Boreali-Amer., 2, p. 146, pl. 46, lower fig., 1831 (1832)—Cumberland House, Saskatchewan.

Specimens collected.—Lake Olomega, 1 (September 8, 1925); Hacienda Chilata, 2 (April 22, 23, 1927); Volcán de Santa Ana, 1 (May 6, 1927).

Status.—Uncommon spring and fall migrant. Detected from 200 to 4,500 feet altitude.

Remarks.—The Lake Olomega and Chilata specimens are typical of the subspecies *richardsonii* in size and coloration. The single bird from Volcán de Santa Ana is probably better referable to the dark, richly colored race of the Pacific northwest, *saturatus* of Bishop, but we list it under *richardsonii* for the time being.

Wood pewees, save for the resident *rhizophora*, were not at all common even during the migrations. Several individuals other than the two collected were seen at Chilata on the dates recorded above, and some of these may have been *richardsonii*.

¹ Sci. Pub. Cleveland Mus. Nat. Hist., 1, p. 114, 1930.

Myiochanes virens sordidulus (Sclater). MEXICAN WOOD PEWEE.

Contopus sordidulus Sclater, Proc. Zool. Soc. Lond., p. 43, 1859—Southern Mexico (Orizaba, Vera Cruz) and Guatemala.

Specimens collected.—Lake Olomega, 1 (August 3, 1925); Rio Goascorán, 4 (October 28, 29, 1925); Volcán de San Miguel, 2 (March 19, 20, 1926); Hacienda Chilata, 1 (April 24, 1927).

Status.—Detected only as a decidedly uncommon spring and fall migrant through the Arid Lower Tropical Zone.

Remarks.—Every one of the above-listed wood pewees was plainly a transient in the locality where it was collected. In characters they are not typical of the subspecies *sordidulus*. They are distinctly lighter-colored than eastern Mexican examples, but are equally small, and the seven males average only 82.5 in wing and 62.5 in tail length. Sclater's type of *Contopus sordidulus* from Orizaba (examined at the British Museum by van Rossem in September, 1933) measures exactly the same as the average given above, but is a decidedly darker bird. Both in the El Salvador series and in the type of *sordidulus* the crown is only slightly darker than the back.

Although careful search was made for wood pewees in the pine-oak association, not a single individual was ever found there, nor in fact anywhere except in the Lower Tropical Zone. There are great areas on the south slopes of the interior mountains which appear to be ideally suited to this species but, as above stated, we failed to find it between January and the latter part of March.

Colors of soft parts.—Adults: iris, dark brown; tarsi and feet, brownish black; bill, brownish black, with basal half of mandible straw color, dull orange, or pale brown.

Myiochanes cinereus brachytarsus (Sclater). SHORT-LEGGED WOOD PEWEE.

Empidonax brachytarsus Sclater, Ibis, 1, p. 441, October, 1859—Córdova, Vera Cruz, Mexico.

Specimens collected.—Lake Olomega, 1 (September 13, 1925); Divisadero, 1 (September 23, 1925); Monte Mayor, 1 (October 8, 1925).

Status.—Uncommon fall migrant to the foothills of the Arid Lower Tropical Zone.

Remarks.—These three specimens are apparently typical of this race. Their appearance in the field, both in life and in the hand,

was so different from the resident *rhizophora* as to lead, at the time, to suspicion of the specific distinctness.

Purely on the authority of Hellmayr we treat both *brachytarsus* and *rhizophora* as races of the South American *Myiochanes cinereus* (Spix). We are inclined to think, however, that *brachytarsus* at least is, in reality, a distinct species.

***Myiochanes cinereus rhizophora* Dwight and Griscom. COSTA RICAN WOOD PEWEE.**

Myiochanes brachytarsus rhizophora Dwight and Griscom, Amer. Mus. Novit., 142, p. 3, November 3, 1924—Punta Piedra, Guanacaste, Costa Rica

Specimens collected.—Rio San Miguel, 4; Lake Olomega, 3; Sonsonate, 2; Lake Channmico, 1; San Salvador, 3; Hacienda Chilata, 2; Lake Guija, 2.

Status.—Common resident between 200 and 2,300 feet in the foothill region of the Arid Lower Tropical Zone.

Remarks.—Although described from the mangrove association on the Pacific coast of northern Costa Rica and at that time presumably confined to that area, *rhizophora* in El Salvador is a bird of the foothills. No wood pewees of any sort were found in the lowlands below 100 feet.

The series of seventeen specimens is not separable in color from typical *rhizophora* from Costa Rica. The bills vary considerably, some being as small as in typical *rhizophora*; others are fully as large as in *brachytarsus*. This condition possibly indicates merge with the latter form at no great distance to the northward. The chief characteristics differentiating *rhizophora* from *brachytarsus* are its extreme grayness at all seasons of the year and its decidedly smaller size.

This is the most common species of the genus to be found in El Salvador and may be found everywhere, usually in the vicinity of water, from the first foothills up to about 2,300 feet. San Salvador and Chilata mark the upper limits of distribution. The lower limit is about 200 feet, at which elevation it was found at Rio San Miguel and Lake Olomega. Both of these places mark the first terrace of foothills. It is probable that *rhizophora* is strictly resident, for pairs are the rule throughout the year.

Nesting.—A nest found at Hacienda Chilata on April 23, 1927, was in course of construction. It was placed on a dead, horizontal branch of a tall tree shading the coffee and was about forty feet from the ground. Both birds were carrying material for this nest.

At Lake Guija on May 27, 1927, a nest, also unfinished, was noted on a horizontal, dead willow branch about twenty feet above a stream. On May 28, in the same locality, a nest was seen in a giant fig tree. This last was placed close to the trunk and densely shaded; the others were open to the sky. Full-grown juveniles were taken July 24 and August 6. One taken August 15 is about halfway through the postjuvinal molt. Apparently only one brood is raised each year.

Colors of soft parts.—Adults: maxilla, tarsi, and feet, black; mandible, pale yellow. Juveniles: similar, but maxilla blackish brown and mandible dusky orange.

***Myiochanes pertinax minor* Miller and Griscom. NICARAGUA
FLYCATCHER.**

Myiochanes pertinax minor Miller and Griscom, Amer. Mus. Novit., 159, p. 5, February 16, 1925—Between San Rafael del Norte and Jinotega, Nicaragua.

Specimens and records.—Mt. Cacagatique, 7 (November 30 to December 21, 1925); San José del Sacare, 4 (March 12 to 16, 1927). Also noted at Los Esesmiles in February, 1927.

Status.—Fairly common resident of the oak and pine association in the Arid Upper Tropical Zone along the cordillera.

Remarks.—The eleven specimens collected have the small size of northern Nicaragua birds and appear not to differ from them in color. The wings of the four males vary from 95 to 99 mm. and of the seven females from 88.5 to 96 mm.

This is one of the most characteristic species of the interior oak-pine association, with which it appears to be coextensive in distribution. It was most numerous between 3,500 and 5,000 feet, however, and above 6,000 was decidedly rare. During the winter months only single birds were seen and, like other members of the genus *Myiochanes*, it appears to be solitary except during the breeding season. Pairs, evidently preparing to breed, were the rule at San José del Sacare in the middle of March. At any time of the year the favorite lookout perches are the tips of tall, dead oaks and pines, from which the birds make repeated, short flights after passing insects. Their common call-note, a loud "quip-quip," usually advertises the presence of this flycatcher in a locality, and were it not for this it could be easily overlooked.

Colors of soft parts.—Adults: iris, dark brown; tarsi and feet, black; maxilla, black; mandible, dull orange.

***Empidonax flaviventris* (Baird and Baird). YELLOW-BELLIED FLYCATCHER.**

Tyrannula flaviventris W. M. and S. F. Baird, Proc. Acad. Nat. Sci. Phila., 1, p. 283, 1843—Carlisle, Pennsylvania.

Specimens collected.—Monte Mayor, 1 (October 8, 1925); Mt. Cacaguatique, 3 (November 30, December 1, 7, 1925); Puerto del Triunfo, 1 (January 5, 1926); Rio San Miguel, 2 (February 5, 17, 1926); San José del Sacare, 1 (March 18, 1927); Volcán de San Miguel, 1 (March 25, 1926); Barra de Santiago, 1 (April 6, 1927); Lake Olomega, 1 (April 7, 1926); Chilata, 6 (April 22 to 30, 1927).

Status.—Fairly common in fall, winter, and spring throughout the Lower Arid Tropical Zone and, locally, in the lower edge of the oak-pine association in the Arid Upper Tropical. Extreme elevations are sea level and 3,600 feet. Dates of arrival and departure are October 8 and April 30.

Remarks.—The yellow-bellied flycatcher, while confined to levels below 3,600 feet, was, during the proper seasons, fairly numerous and evenly distributed. Although found in all sorts of woodland it shows preference for thin, open undergrowth beneath heavy forest. In such an environment it was particularly common at Puerto del Triunfo and on Mt. Cacaguatique.

It was noticeable that the winter population remained fixed, and there was little or no local shifting once the winter quarters were selected. Each individual had its own particular patch of shrubbery where it could be seen or heard at all times of the day.

The northward movement starts early in April. At Barra de Santiago on April 6, 1927, there was a very noticeable migration of northward-traveling vireos, warblers, and small flycatchers (including the present one) drifting through the woods. During the latter part of April, 1927, at Chilata this particular flycatcher was very common and most, if not all, of these birds noted were obviously migrants. It was still common on April 30, the last day spent in that locality, and the actual date of last departure is, therefore, likely to be some time in the early part of May.

Plumage notes.—The plumage sequences of *Empidonax* have always been puzzling owing to the fact that most, if not all, of the northern species leave their breeding grounds and pass south before molting. For this reason Dwight's treatment of the several species of this genus¹ with which he had to deal, was necessarily fragmentary

¹ Ann. N. Y. Acad. Sci., 13, pp. 145-148, 1900.

in nature, and such conclusions as were reached were largely hypothetical. Happily, we can now verify some of his conjectures and also add some additional data.

The postjuvenile plumage (the "first winter plumage") is, as supposed by Dwight, not fully acquired until very late in the fall. A specimen taken October 8 is still largely in juvenile feather ventrally, while one taken November 30 still shows many juvenile feathers on the lower throat. This is the last part of the body plumage to be replaced. The juvenile remiges and rectrices are retained until April. In early April there commences a complete spring molt (the "first prenuptial") which involves the entire body and the replacement of the old, worn juvenile wing and tail feathers. A specimen collected April 6 has just commenced this molt and six others, taken between April 22 and April 30, represent every stage to its completion.

The adults vary a good deal in the time of completion of the fall molt. Dwight mentions a bird from Tehuantepec which was molting January 1, and in which the old wings and tail were still present. In the present adult series, two specimens taken December 1 and 7, respectively, have nearly finished the body molt. The wing molt is extremely slow and, starting as it does about the time the last of the new body plumage has been acquired, takes most of the winter and early spring. Some dates showing this extremely slow rate are: December 1, fifth primary; February 5, complete except for innermost tertials; February 17, seventh primary; March 25, sixth primary; March 18, complete. Thus the wing replacement fills in, roughly, the time interval between the winter (postnuptial) and spring (prenuptial) molts. The complete, spring, body molt of the adults (and juveniles) begins in late March and is finished by the end of April.

***Empidonax traillii traillii* (Audubon). ALDER FLYCATCHER.**

Muscicapa traillii Audubon, Birds Amer. (folio), 1, pl. 45, 1828—woods along the prairie lands of the Arkansas River.

Specimens collected.—Lake Olomega, 6 (August 25 to September 13, 1925); Divisadero, 1 (September 25, 1925); Rio Goascorán, 1 (October 25, 1925); Colima, 1 (January 22, 1927); Rio San Miguel, 2 (February 3, 10, 1926).

Status.—Fairly common fall migrant and less common midwinter visitant to the lowlands. Extremes of altitude are 200 and 1,000 feet. Dates of arrival and departure are August 25 and February 10.

Remarks.—This species is a very common fall migrant and winter visitant to the lowlands, but to work out the relative proportions of eastern and western forms would have required the preparation of a far larger series of specimens than there was time to collect. It is evident, however, that the eastern race is very much the less common of the two, a rough estimate being one *traillii* to three *brewsteri*. The eastern race seems to arrive later and depart earlier than the western, but this, too, is only conjecture for, as above stated, the relatively few *traillii* could easily have escaped notice when mixed with the far more numerous *brewsteri*.

Plumage notes.—As stated by Dwight, this species molts after its arrival in the winter home. The fall molt of the adults commences in late September and is not complete until midwinter; in one case at least, as late as January 22. Doubtless this race resembles *brewsteri* in having a complete adult body molt in the spring and an entire molt including wings and tail in the case of the immatures, but no specimens were taken after February 10, a date too early to show the spring plumage changes.

***Empidonax traillii brewsteri* Oberholser. TRAILL'S FLYCATCHER.**

Empidonax traillii brewsteri Oberholser, Ohio Journ. Sci., 18, p. 93, 1918—Cloverdale, Nye County, Nevada.

Specimens collected.—Lake Olomega, 5 (August 14, 16, September 3, 1925; April 7, 1926); Divisadero, 1 (September 29, 1925); Rio San Miguel, 4 (February 3, 4, 1926); Barra de Santiago, 3 (April 6, 9, 12, 1927); Lake Chanmico, 1 (May 14, 1912).

Status.—Common, locally abundant, in fall, winter, and spring throughout the lowlands. Dates of arrival and departure are August 14 and May 14.

Remarks.—The first fall arrivals of this species appeared August 14, 1925 in the flooded forest at Lake Olomega, and within a few days it became extremely common all through the undergrowth. By far the greater part were of the western subspecies, *brewsteri*. During the winter Traill's flycatchers were fully as abundant as during the fall, and as many as fifty were seen in one day in the willows and shrubbery along the San Miguel River. Out of four specimens taken at random in that locality on February 3, 1927, three were *brewsteri* and only one was *traillii*. Between April 1 and 12, 1927, during the spring migration, these flycatchers were literally swarming in the underbrush of the sandy peninsula at Barra de Santiago. Three specimens taken were all *brewsteri*. The record for Lake Chanmico

on May 14, 1912, while very late, is not remarkable, for Carriker¹ records specimens of both races as late as May 10, in Costa Rica.

Plumage notes.—Like *traillii*, this form molts after arrival from the north. A specimen taken September 3 has just commenced the molt, while one taken on the 29th has nearly completed the body molt and is halfway through the primary molt. One of those taken February 3 is in very fresh plumage, and it is not unlikely that *brewsteri*, as in the case of the allied form, sometimes drags along with the wing molt until late in the winter. In the spring there is a complete body molt, which is finished just before the northward migration in April.

The young retain the juvenal remiges and rectrices through the winter, and in April go through a complete molt (including remiges and rectrices) exactly as do the young of *Empidonax flaviventris*. Therefore, Dwight was mistaken in supposing that the "first nuptial" and "adult nuptial" plumages are acquired by wear. The material collected in El Salvador is conclusive that they are acquired by molt exactly as in *flaviventris*.

***Empidonax minimus* (Baird and Baird). LEAST FLYCATCHER.**

Tyrannula minima W. M. and S. F. Baird, Proc. Acad. Nat. Sci. Phila., 1, p. 284, 1843—Carlisle, Pennsylvania.

Specimens and records.—Lake Olomega, 1 (September 3, 1925); Monte Mayor, 2 (October 6, 8, 1925); Divisadero, 2 (October 14, 18, 1925); Mt. Cacaguatique, 1 (December 9, 1925); Puerto del Triunfo, 1 (January 4, 1926); Rio San Miguel, 1 (February 20, 1926); San Salvador, 6 (February 28, March 8, 11, 14, April 1, 10, 1912); Volcán de Conchagua, 2 (March 3, 5, 1926); Volcán de San Miguel, 1 (March 18, 1926); San José del Sacare, 1 (March 18, 1927); Chilata, 1 (April 22, 1927). Also noted at Colima (January 21 to 27, 1927); Barra de Santiago (April 8, 1927).

Status.—Common in fall, winter, and spring throughout the Arid Lower Tropical Zone. The species is most numerous below 2,500 feet, and rare and local as high as 3,500 feet. There is one record for the pine-oak association of the Arid Upper Tropical Zone at 3,600 feet. Arrival and departure dates are September 3 and April 22.

Remarks.—The least flycatcher occurs over the same country occupied by *Empidonax flaviventris*. The two are present in about

¹ Ann. Carnegie Mus., 6, p. 699, 1910.

the same numbers, relatively, and both are found in similar situations, that is to say, undergrowth in the woods, mimosa thickets, shrubbery along watercourses, or in the top foliage of low, open woods. Probably in aggregate numbers the visiting species of *Empidonax* are more or less on a parity, but the concentration of *traillii* in the lowlands and of *hammondii* in the higher mountains makes these two appear more abundant than the more generally dispersed *flaviventris* and *minimus*.

Plumage notes.—The molts and plumages of the least flycatcher parallel those of *flaviventris* and *traillii*. In other words the "first nuptial" and "adult nuptial" plumages are acquired by molt and not, as supposed by Dwight, by wear.

***Empidonax hammondii* (Xantus). HAMMOND'S FLYCATCHER.**

Tyrannula hammondii Xantus, Proc. Acad. Nat. Sci. Phila., 10, p. 117, 1858
—Fort Tejón, California.

Specimens collected.—Mt. Cacaguatique, 11 (November 21 to December 15, 1925); Los Esesmites, 2 (February 2 to 26, 1927); San José del Sacare, 1 (March 12, 1927).

Status.—Common winter visitant to the oak-pine association of the Arid Upper Tropical Zone of the interior mountains, rarely straggling as high as 8,700 feet in the cloud forest of the Humid Upper Tropical. Extremes of elevation are 3,500 and 8,700 feet. Dates of arrival and departure are November 21 and March 12.

Remarks.—As Hammond's flycatcher has been supposed to reach its southern limit in the highlands of northern Guatemala, it was with considerable surprise that it was encountered as a common species throughout the oak-pine association in the cordillera of El Salvador. It is probable that the date of arrival is somewhat in advance of that given above, for the birds were present in numbers on November 21, the initial day of collecting on Mt. Cacaguatique.

Plumage notes.—Hammond's flycatcher differs materially from the other visiting species of *Empidonax* in that it molts before leaving the north. We have many specimens from the United States showing all stages of the postjuvenal and adult fall molt which begins in August and is ordinarily complete by the latter part of September. In this species the juvenal rectrices (but not the remiges) are replaced with the body plumage at the postjuvenal molt. Another point of difference is that the spring molt ordinarily is not extensive. Good series of migrating spring specimens taken in

various western states in April and May show varying amounts of new body feathers, particularly on the foreparts and back, but most of the plumage is that acquired at the molt of the previous fall.

It may be noted that the wing formula given for *hammondi* in Part 4 of *Birds of North and Middle America* is by no means constant. It is true that the majority of specimens have the outermost (10th) primary longer than the 5th, but in occasional males and still more frequently in females, the outermost primary is shorter than the 5th, thus throwing some specimens of *hammondi* into group "e" and some into "ee." The same condition is observable in some examples of *Empidonax minimus*.

***Empidonax flavescens dwighti* van Rossem. DWIGHT'S
FLYCATCHER.**

Empidonax flavescens dwighti van Rossem, Auk, 45, p. 359, July, 1928—Los Esesmiles, Chalatenango, El Salvador; *ibid.*, Mt. Cacaguatique; Volcán de Santa Ana; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 264, 1932—Salvador (*crit.*).

Specimens collected.—Mt. Cacaguatique, 7; Los Esesmiles, 5; Volcán de Santa Ana, 8.

Status.—Fairly common resident in the Humid Upper Tropical Zone of the interior mountains and on Volcán de Santa Ana. Extremes of elevation are 3,500 and 8,700 feet.

Remarks.—To Dr. Jonathan Dwight properly belongs the credit for the discovery that the common, bright green *Empidonax* which is resident in the mountains of Central America is not *Empidonax salvini* Ridgway, the type of which is most probably a migratory example of *Empidonax difficilis bairdi*.¹ As stated in the original description of *dwighti*, the chief differences which distinguish it from *salvini* are the wedge of green on the upper eyelid which interrupts the pale buffy eyering (which in *salvini* is continuous as in *flaviventris*) the brighter green coloration, and the yellowish green instead of buffy wing bands. The description of "*Empidonax salvini*" in Part 4 of "*Birds of North and Middle America*" (p. 582) was obviously drawn from a specimen of *dwighti*. The type of *salvini* was accurately characterized in the original description in "*The Ibis*" (1886, p. 459).

Both *dwighti* (*salvini* of recent authors) and *flavescens* are treated by Hellmayr² as races of *Empidonax difficilis* Baird, a course to which

¹ Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 263, 1932. For disposition of the name *bairdi*, see van Rossem, Bull. Mus. Comp. Zool., 77, no. 7, p. 393, Dec., 1934.

² Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 214, 1927.

we cannot subscribe. There is little doubt that *difficilis* and *flavescens* are closely related, for both have the interrupted eyering, a very similar wing formula, and almost identical habits and call-notes; on the other hand the color differences are very pronounced and are not, so far as we know, bridged by intergrades. In matters of this nature there are, of course, no criteria other than those of personal opinion.

Dwight's flycatcher was fairly common in the damp ravines and undergrowth of the cloud forests, both on Los Esesmites and Volcán de Santa Ana (pl. XX). In November and December it was also fairly numerous in the shrubbery along stream beds in the ravines on Mt. Cacagatique and perhaps is resident there. Whether there is a partial shifting to lower levels during the colder months or whether the species is permanently and strictly resident wherever found is a question that cannot be answered at present.

Nesting.—A nest found on Cerro de Los Naranjos on the north-west slope of Volcán de Santa Ana on May 13, 1927, held two eggs which were on the point of hatching and therefore were not collected. They were very similar to eggs of *Empidonax difficilis*, but rather more heavily spotted. The nest was placed directly on top of an older one, making it a "double deck" affair. It was built of bright green moss and lined with fine dried grass stems. Since it was packed into a deep, vertical fold in the moss-covered bark of a large wild fig-tree, it was extremely well hidden and discovered only through the accidental sight of one of the parents leaving the nest. Another nest, found in the same locality, was tucked behind a bunch of parasitic growth growing from the under side of a sharply leaning tree. It was of identical construction with the first and on May 16 contained two half-grown young.

Plumage notes.—As in most other species of *Empidonax* the juvenal remiges and rectrices are retained through the first winter. The specimens taken on Mt. Cacagatique in late November and December had finished the fall molt in both adults and young of the year. Material to outline the spring molt is lacking, but it is certainly not very extensive, for May examples from Volcán de Santa Ana are all in worn plumage both as to body and flight feathers.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; maxilla, black; mandible, flesh color tinged with orange; tarsi and feet, plumbeous or brownish plumbeous.

***Empidonax fulvifrons inexpectatus* Griscom. HONDURAS BUFF-BELLIED FLYCATCHER.**

Empidonax fulvifrons inexpectatus Griscom, Proc. New Eng. Zool. Club, 13, p. 60, November 7, 1932—Cerro Cantorál, Dist. of Achagua, Honduras.

Specimens collected.—San José del Sacare, 4 (March 12, 13, 1927).

Status.—Detected in spring at 3,600 feet in the pine-oak association of the Arid Upper Tropical Zone.

Remarks.—The four specimens are typical in color of *Empidonax fulvifrons fusciceps* Nelson of Chiapas and Guatemala, but in size are best referable to *inexpectatus*. The wings of the three males average 57.3 mm.

Whether this subspecies is resident or migratory is not possible to state. It was very rare in the pine-oak association about San José del Sacare, and the four specimens collected were all that were seen. They were not in pairs, but occurred singly, usually in company with drifting troops of nonresident warblers and vireos. They most certainly were not breeding at the time.

Colors of soft parts.—Adults, sexes alike: iris, maxilla, tarsi, and feet, dark brown; mandible, orange-yellow.

***Mitrephanes phaeocercus quercinus* Dickey and van Rossem. EL SALVADOR DUSKY-TAILED FLYCATCHER.**

Mitrephanes phaeocercus quercinus Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 2, January 8, 1927—Mt. Cacaguatique, Dept. San Miguel, El Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 267, 1932—El Salvador (crit.).

Specimens collected.—Mt. Cacaguatique, 7 (November 26, 30, December 1, 5, 7, 16, 1925).

Status.—Uncommon in winter (probably resident) in the oak association on Mt. Cacaguatique, where it was observed only between 3,000 and 4,000 feet altitude.

Remarks.—The characters distinguishing *quercinus* from typical *phaeocercus* of the Vera Cruz district of Mexico are the darker and richer coloration, with still darker and more contrasted pileum.

This race of the dusky-tailed flycatcher must be extremely local, for in no locality other than Mt. Cacaguatique was it found. Practically all of the individuals encountered were in the oak association, and the rare exceptions were evidently only stragglers from it. They were most likely to be found in the middle heights, between

the undergrowth and the crown foliage, which environment they shared with *Empidonax hammondi* and *Empidonax flaviventris*.

These birds were evidently resident in the region, for they were most likely to be found in pairs. They frequently attached themselves temporarily to slowly traveling flocks made up of both resident and migratory warblers, vireos, and flycatchers, but did not accompany them for any great distance and sooner or later were sure to be back at the regular stands.

Plumage notes.—The fall molt of adult and young occurs very late, and the new plumage is not fully acquired before midwinter. Three birds of the year taken on December 5 and 7, are only at this late date replacing the pale, buffy wing-bars for the brown ones of maturity. The juvenal remiges and rectrices are retained, since the postjuvinal molt involves only the body, just as in *Empidonax flaviventris*, *traillii*, *minimus*, and *dwighti*.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; tarsi, feet, and maxilla, black; mandible, dull orange-yellow.

***Onychorhynchus coronatus mexicanus* (Sclater). MEXICAN ROYAL FLYCATCHER.**

Muscivora mexicana Sclater, Proc. Zool. Soc. Lond., p. 295, 1856 (January 26, 1857)—Córdoba, Vera Cruz, Mexico.

Specimens collected.—Barra de Santiago, 2 (April 6, 1927).

Status.—Fairly common in spring, and presumably resident, in the forests of the coastal plain in the extreme southwestern corner of the republic.

Remarks.—The basis for including this race in the present report is a pair of birds collected in the swamp forest at Barra de Santiago April 6, 1927. These are somewhat paler and larger than examples of *fraterculus* from Costa Rica and the Oriente of El Salvador. The male measures: wing, 90; tail, 72; exposed culmen, 25.2; female: 83; 67; and 23.2. Both Ridgway¹ and Hellmayr² give the range of *mexicanus* as south to Guatemala and of *fraterculus* as north to Nicaragua. The whole Central American population of this species is, of course, a graduated series of intergrades, and the fixing of a locality as the dividing point is a purely arbitrary matter. However, the two Barra de Santiago specimens are very close to typical *mexicanus*, both in color and measurements, and can be referred only

¹ Bull. U. S. Nat. Mus., 50, pt. 4, p. 354, 1907.

² Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 260, 1927.

to that form. In accordance with this distribution is the manner of occurrence of several other forms which reach their southern limits in western El Salvador, among them *Platypsaris aglaiae sumichrasti*, *Vireo pallens ochraceus*, and *Thryophilus pleurostictus oblitus*.

***Onychorhynchus coronatus fraterculus* Bangs. LESSER ROYAL FLYCATCHER.**

Onychorhynchus mexicanus fraterculus Bangs, Proc New Eng. Zool. Club, 3, p 86, March 31, 1902—Santa Marta, Colombia

Specimens collected.—Lake Olomega, 3 (September 13, 1925; April 9, 1926); Puerto del Triunfo, 1 (January 4, 1926); Rio San Miguel, 3 (February 2, 5, 8, 1926).

Status.—Uncommon resident of more densely forested sections of the coastal plain, west at least to the vicinity of Puerto del Triunfo. The maximum elevation at which the species was found was 200 feet.

Remarks.—The series of seven specimens taken in the Oriente of El Salvador is intermediate in characters between *mexicanus* and *fraterculus*, but is probably better classified as the latter. They are practically indistinguishable from Costa Rica birds in measurements, but are a trifle paler dorsally. The three males average: wing, 86.7; tail, 70.7; exposed culmen, 23.3; four females: 79.3; 66.3; and 22.7.

Royal flycatchers appear to be confined to the swamp forests near the coast and were seldom found far from the immediate vicinity of water. They were more numerous at Puerto del Triunfo than anywhere else, but even there could not be called common, for only about a dozen all told were seen during the month in which collecting was carried on in that locality.

In life these birds resemble the smaller species of *Myiarchus*, for the general size and call-notes are much the same, and color, in the half twilight under heavy forest, is not a matter of much importance. The brilliantly colored crest is not ordinarily visible at all, for it is carried compressed into an inconspicuous tuft which lies back on the nape. So far as we observed it is fanned out laterally, and with but slight elevation, only in moments of excitement or curiosity. The following notebook extract (van Rossem) deals with the royal flycatcher as it was observed in the swamp forest at Puerto del Triunfo. "Today I was hidden in a clump of undergrowth beside a boggy stream in the deep jungle, waiting for curassows, when I heard an unfamiliar note in the open, middle heights a little to one side. It was a little like the ordinary call-note of *Myiarchus crinitus*, but more emphatic and flatter. After a few minutes a male royal

flycatcher appeared and sat within a few feet of me with body nearly horizontal, plumage tightly compressed, and his only movement an occasional nervous lateral fanning out of the scarlet crest. He soon lost interest, however, and resumed feeding in the thin leaf growth. The feeding habits and flight were much like *Myiarchus*."

Colors of soft parts.—Adults, sexes alike: iris, dark brown; bill, brownish black, changing to brownish orange on basal third of mandible; tarsi and feet, orange-brown; soles of feet, bright yellow-orange.

Stomach contents.—Insects exclusively, 1.

***Platyrinchus cancrominus* Sclater and Salvin. MEXICAN SPADE-BILLED FLYCATCHER.**

Platyrhynchus cancrominus Sclater and Salvin, Proc. Zool. Soc. Lond., p. 299, 1860—Choctum, Vera Paz, Guatemala

Specimens collected.—Zapotitán, 2 (June 10, 11, 1912).

Status.—Rare and local in midsummer in the dense swamp forest at Zapotitán.

Remarks. The validity of the race *dlutus* recently described by Miller and Griscom¹ from western Nicaragua, has been questioned by Hellmayr,² who states that he is unable to recognize it. The two El Salvador specimens are identical in dorsal coloration with three from northwestern Costa Rica and, making due allowance for wear, very similar, if not identical, on the underparts.

Only three of these little flycatchers were seen in El Salvador, all of them in 1912 at Zapotitán, where they occurred singly in thin underbrush in boggy places beneath dense forest. A visit to the same locality in 1927 failed to disclose a single bird of this species, although many hours were spent in systematically searching the woods where they had been found fifteen years before.

***Tolmomyias sulphureus cinereiceps* (Sclater). GRAY-HEADED FLYCATCHER.**

Cyclorhynchus cinereiceps Sclater, Ibis, 1, p. 443, 1869—Oaxaca, Mexico.

Specimens collected.—Monte Mayor, 1; Chilata, 5; Lake Olomega, 12; Rio San Miguel, 1; Lake Guija, 1; Barra de Santiago, 1; Mt. Cacaguatique, 1; Divisadero, 1; San Salvador, 1.

Status.—Common resident in wooded areas throughout the Arid Lower Tropical Zone, centering in the foothills and very much less numerous at sea level and above 2,000 feet.

¹ Amer. Mus. Novit., 159, p. 4, 1925.

² Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 269, 1927.

Remarks.—Carriker¹ has commented already on the extraordinary variation to which the bills of the slaty-headed flycatchers are subject. This variation appears to be due to neither age nor sex. Neither are the prominent ridges noted by Carriker confined to the narrow extremes, as was the case in his series, for in the present lot some of the very broadest-billed examples have the most pronounced ridges on the maxilla. These variations are hardly to be called abnormalities, but rather are normal to, and characteristic of, the species. Many genera of good standing have been founded on differences less conspicuous than are present in this one subspecies! The two extremes figured (fig. 18) are both fully adult males.

This species is rather "colorless" and inconspicuous. It is decidedly sedentary in habits and usually keeps pretty well concealed in foliage at no great height from the ground. Therefore it is difficult



FIG 18. Variation in bills of the gray-headed flycatcher, *Tolmomyias sulphureus unciniceps*

to estimate the numbers present in a locality. At Chilata in April more were observed than at any other station, but this may have been, in part, due to activity incident to the breeding season. The great majority of the specimens taken were shot before they were recognized, being taken simply because they were small, unknown greenish yellow birds that showed for an instant in the undergrowth or low treetops.

Nesting.—The characteristic nests of slaty-headed flycatchers were often seen swinging from the tips of long slender branches of the iscanal and other thorny trees. They are invariably thinly woven of fine, black, hairlike material secured from an unknown source. The nests are pendent, about six or seven inches long by three or four wide, and the entrance is through a short, downward-projecting tunnel. They are almost always hung close to wasps' nests. Nests were being built at Chilata during the latter half of April.

¹ Ann. Carnegie Mus., 6, p. 724, 1910.

Plumage notes.—The postjuvenile molt of this species includes remiges and rectrices, and at its completion the young of the year and adults are precisely alike. The fall molt of the adults and the postjuvenile molt of the young commence about August 1 and are finished by about the middle of September. There is apparently no spring molt, at least careful examinations of seven examples, taken at various dates between February 10 and April 25, failed to disclose any.

Colors of soft parts.—Adults, sexes alike: iris, varying from pale gray, yellowish white, and pale, grayish white to dark gray, independently of age or sex; maxilla, dark brown or brownish black; mandible, flesh color, usually tinged with bluish or lilac, tip black; tarsi and feet, pale brown, varying to flesh color. Juveniles: similar, but mandible, tarsi, and feet, flesh color.

Stomach contents.—Insects only, 9. This species is frequently to be found in the vanguard of foraging army ants, busily catching small-winged insects which fly up in swarms as the ants advance.

***Rynchocyclus brevirostris brevirostris* (Cabanis). SHORT-BILLED FLYCATCHER.**

Cyclorhynchus brevirostris Cabanis, Arch. Naturg., 13, p. 249, 1847—Jalapa, Vera Cruz, Mexico.

Specimens collected.—Volcán de Santa Ana, 2 (May 12, 20, 1929).

Status.—Detected only as a rare summer resident in the cloud forest of the Humid Upper Tropical Zone on Volcán de Santa Ana.

Remarks.—The only two specimens of this species which were noted were shot from the top foliage of large trees overhanging deep ravines on Cerro de Los Naranjos on the northeast flank of Volcán de Santa Ana. The first was taken at 5,000 feet, the second at 5,500.

Nesting. The female, taken May 12, was evidently incubating eggs at the time.

Plumage notes. The male, taken May 20, is obviously a bird of the previous year. It is in the midst of a complete molt including remiges and rectrices and in exactly the same stage of molt as the one-year-old individuals of *Empidonax flaviventris* taken the last week in April at Chilata. The outer web of the first (old juvenal) primary is roughened in this specimen although not to the extent usual in fully adult males, the barbs being shorter and not so stiff.

Colors of soft parts.—Not recorded from fresh specimen. In dried skin: maxilla, brownish black; mandible, pale, dull yellow; tarsi and feet, plumbeous brown.

Todirostrum cinereum finitimum Bangs. NORTHERN TODY-FLYCATCHER.

Todirostrum cinereum finitimum Bangs, Proc. Biol. Soc. Wash., 17, p. 114, May 18, 1904—San Juan Bautista, Tabasco, Mexico.

Specimens and records.—Lake Chanmico, 9; Lake Olomega, 7; Divisadero, 2; Puerto del Triunfo, 1. Also noted at Zapotitán; Lake Guija.

Status.—Common, rather local resident of brush-land and forest undergrowth throughout the Arid Lower Tropical Zone below 1,500 feet.

Remarks.—When one is walking through woodland in the lower country, he often hears the peculiar clicking notes of these little flycatchers. The first impression is that of a much louder call coming from a hundred yards or so away, but a glance around will usually show a tody perched within a few feet, its very smallness and lack of motion serving as concealment. At short intervals come the series of sharp clicks, accompanied by violent wigwagging of the short tail. The clicker's curiosity being finally satisfied, it resumes feeding, making short flights from some stand low in the underbrush or working through higher foliage in company with other small birds such as warblers and vireos. There seems to be a decided preference for the vicinity of water, particularly the quiet, stagnant borders of ponds or lakes. The only area where they were at all common at Divisadero was in the trees and undergrowth along a small, slowly running stream, whose bordering growth had for some reason escaped the general destruction of timber.

In the spring and early summer tody flycatchers are only to be found in pairs. Once the young are on the wing, family parties of four or five stay together even through the succeeding winter, and to that extent it might be said that this species travels in small flocks. A small group drifting through the undergrowth or middle heights keeps up a continual piping, evidently as a means of keeping the group together. The clicking note spoken of is purely an alarm call.

Nesting.—The characteristic and beautifully constructed nests (pl. XX, fig. 1) were found on a few occasions, the sites being invariably the tips of small twigs pendent above water. The custom of hanging the nest to small branches close to the trunk not only provides better concealment for it, but makes it resemble a small bunch of drift or lodged leaves. The nest pictured is eight inches long by four inches in diameter, and so well was it thatched that the

heavy rain of the night before it was collected had failed even to dampen the interior. The heights at which nests were placed varied from five feet to thirty feet.

Nesting commences about the first of May. A female taken at Lake Chanmico on May 14, 1912, contained a fully formed egg, and well-grown young were seen at Lake Guija on May 24, 1927. A set of three nearly fresh eggs was collected, with the nest figured, at Lake Chanmico on May 23, 1912. This nest was suspended in a tangle of thorny vines over the water and was unnoticed until the parent flushed when the vines were touched. The three white eggs were so surprisingly large for such a tiny bird that it was difficult to believe their ownership until the parent had entered and been flushed from the nest several times. Like all of the eggs collected in 1912, the present whereabouts of this set is unknown. However, Carriker¹ gives the size of eggs taken in Costa Rica as 15 to 15.5×10.5 to 11.5. The latest nesting observed was at Zapotitán where a partially completed nest was noticed on June 10, 1912.

Plumage notes.—Although the sexes are usually described as alike, the differences between adult males and adult females are very pronounced. In males the black extends backward over the whole pileum and frequently to the nape, while in females it rarely extends beyond the line between the posterior corners of the eyes, the hindpart of the crown being slate-gray. The mandibles of the males are broadly black laterally, while those of the females are either immaculate or only narrowly streaked with dark brown. While this is not an absolute sex character, the most narrowly streaked male being marked like the most broadly streaked female, still it is very pronounced and well worth mentioning. Age seems to have little to do with the amount of black present, for one of the juvenile males has the mandible almost solidly black.

After the complete postjuvénal molt, which includes remiges and rectrices, the differences between old and young are lost. This molt usually commences in early August and is complete by the end of September. One specimen which probably represents a very late brood was still partly in juvenal plumage on October 3. Three, of the four specimens collected, were in juvenal plumage with grayish white spots on the crown, forming in effect a more or less concealed crown patch.

¹ Ann. Carnegie Mus., 6, p. 732, 1910.

Colors of soft parts.—Adult male: iris, creamy white; maxilla, black; mandible, flesh color on median line, brownish black laterally; tarsi and feet, plumbeous blue. Adult female: similar, but mandible wholly flesh color or with only narrow streaks laterally. Juveniles: similar to corresponding sexes in adults, but iris dark brown; tarsi and feet, paler. The iris gradually changes color, being pale grayish at the end of the postjuvenal molt and similar to that of the adults by midwinter.

Stomach contents.—Tiny insects exclusively, 3.

***Oncostoma cinereigulare* (Sclater). BENT-BILLED FLYCATCHER.**

Todirostrum cinereigulare Sclater, Proc. Zool. Soc. Lond., 24, p. 295, 1856 (1857)—Córdova, Vera Cruz, Mexico.

Specimens collected.—Lake Olomega, 4; Chilata, 1; Lake Chamico, 2; Zapotitán, 2; Divisadero, 1; Monte Mayor, 1.

Status.—Sparingly, but apparently regularly, distributed resident of woods and brush-lands below 2,000 feet.

Remarks.—Hellmayr¹ considers *Oncostoma cinereigulare* and *Oncostoma olivaceum* as conspecific. Most authors, however, believe them to be distinct species, and this we believe to be correct, although we admit the two have every appearance of being "geographic representatives" of a common stock.

The eleven specimens of this species are definitely lighter and at the same time more brightly colored than skins from Costa Rica and have slightly smaller and less highly arched bills. It is quite possible that sufficient material will show the necessity of recognizing one or more races.

From the little seen of this flycatcher it is a bird of the undergrowth. All of the specimens taken were shot in such an environment, usually in semiopen woods, in coffee groves, or more open places in the swamp forests.

Nesting.—A male taken at Lake Olomega on April 10, 1926, was in full breeding condition.

Plumage notes.—The only molting birds taken are five fall adults, and these show that the annual molt is finished rather earlier than is usual with the local flycatchers. In one case it is virtually complete as early as August 17.

Colors of soft parts.—Adults (males only recorded): iris, pale gray; bill, blackish brown with tomia paler; tarsi and feet, brownish

¹ Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 310, 1927.

plumbeous, varying to flesh color. There is some variation in the mandibles of the males, some being extensively flesh-colored, with the black appearing only as lateral streaks exactly as in *Todirostrum cinereum finitimum*. Immature male (1 only): similar to adults, but iris grayish pink.

Stomach contents.-- Tiny insects exclusively, 3.

***Elaenia flavogaster subpagana* Sclater. NORTHERN ELAENIA.**

Elainea subpagana Sclater, Ibis, p. 36, January, 1860—Dueñas, Guatemala.

Specimens and records.-- San Salvador, 4 (March 7, 29, April 9, 12, 1912); Puerto del Triunfo, 1 (January 15, 1926). Also noted at Zapotitán (June 10, 1912).

Status.-- Rare and local resident below 2,500 feet in the coastal range and on the coastal plain.

Remarks. This flycatcher is one of the rarest birds in El Salvador, and the five specimens taken represent all that were seen, except for a pair of adults with their single young noted at Zapotitán, and the mate of the bird taken at San Salvador on April 12. All of those taken or noted at San Salvador were in tall trees forming division rows between fields, or else in solitary shade trees along country roads. The single specimen collected at Puerto del Triunfo came to a berry-bearing tree in the yard of the old, abandoned hotel. No others were seen in that locality, although close watch was kept on the constantly arriving and departing stream of birds which visited the tree.

The size, flight, and carriage of this flycatcher remind one very much of the phainopepla. The crest is kept well raised, and there is the same nervous tail twitching so characteristic of the latter bird. Except for one pair seen at San Salvador on April 12, 1912, and the nesting pair at Zapotitán, all those noted were solitary.

Nesting. A nest occupied by a single, two-thirds-grown young was found in a dead mimosa bush (*Acacia farnesiana*) at Zapotitán on June 10, 1912. It was placed in a triple crotch four feet from the ground and resembled, both in size and shape, a flattened-out nest of *Poliophtila*, even to the covering of lichens. As a matter of opinion, it very probably was a pre-empted nest of that species, for the notes of that day mention it as "an old gnatcatcher's nest lined with down, which held one, two-thirds-grown young of *Elaenia* which completely filled the nest."

Plumage notes.—The specimens taken in March and April show a very limited spring body molt.

Colors of soft parts.—Not recorded.

Elaenia obscura frantzii Lawrence. FRANTZIUS' ELAENIA.

Elainea frantzii Lawrence, Ann. Lyc. Nat. Hist. New York, 8, p. 172, 1867—San José, Costa Rica.

Specimens collected.—Los Esesmites, 8 (February 2 to 28, 1927); Volcán de Santa Ana, 11 (May 6 to 17, 1927).

Status.—Common resident of the Arid Upper Tropical Zone on Los Esesmites and on the summit of Volcán de Santa Ana.

Remarks.—Many of the specimens from El Salvador are more greenish, less brownish dorsally and more yellowish, less whitish below, than is the average of a small series from Costa Rica, but these differences are not constant. This tendency, while interesting, is not such that it can be emphasized by a formal name. Ludlow Griscom¹ has described a race, *Elainea obscura ultima*, from the mountains of Guatemala, the range to include also the mountains of Honduras. However, the ascribed characters, browner above and darker below as compared with *frantzii*, are just the opposite of the tendencies shown by these El Salvador specimens; hence the latter cannot be *ultima*.

Frantzius' elaenia is a bird of the high mountains, and in no place does its range meet that of the two lowland species. On Los Esesmites it was found to be very common in the pines and oaks from about 6,000 feet up to the limit of the Arid Upper Tropical Zone at 8,700 feet. Though none was seen above the latter altitude, a few were noticed at openings in the cloud forest at various places between 7,000 and 8,000 feet. However, it was evident that this bird preferred the arid zone on the south slope of the mountain where it was a characteristic species. During February and early March pairing had just commenced, but single birds were still much more common than pairs and, although there was no opportunity to observe them at the height of the winter season, there is little doubt that this flycatcher is, by nature, solitary except when breeding.

The ordinary call-note is a drawn-out "p-e-e-e-r" which is so much like the call of the western wood pewee that sometimes we had to collect a bird to be sure of its identity. Since this elaenia is an air feeder and perches in conspicuous places, the resemblance

¹ Ibis, p. 550, July, 1935.

to *Myiochanes* is all the more striking. Besides the ordinary call-note there is a really beautiful song which was heard only on Los Esesmites. It would need no apology if given by a recognized songster, but coming from a flycatcher, a member of a family classified as "songless perching birds," it was doubly effective. It was first heard by van Rossem on February 22, when he was waiting for the appearance of a house wren which was chattering in a nearby pile of fallen oak branches. At first the singer was subconsciously placed as a brown mountain robin, then as a slate-colored solitaire, and then it was realized that it was different from either. Prompt investigation followed and was thus mentioned in the notes of the day. "Saw a Frantzius' elaeinia towering in full song over some oaks at 7,500 feet. The song is fully equal to that of *Turdus plebejus* or *Myiadestes unicolor*, and in quality resembles both of those species, though it is not nearly so loud. There is no doubt as to the identity, for I shot the female above which he was towering and to which he came after every flight. The singing bird hovered about thirty to forty feet above the tree in which his mate was perched and sang only when on the wing."

This flycatcher was not again encountered until May of the same year (1927), when it was found to be one of the two most abundant species on the 7,200-foot-summit of Volcán de Santa Ana. Here, both on the tree-dotted prairie and at the edge of the cloud forest, probably two hundred were seen on each of the several visits made to the locality. At this time, just as formerly, it was very evident that the Arid Upper Tropical associations were favored, for although a great many birds were flying about, and probably nesting, at the edge of the cloud forest, they did not penetrate the heavy woods of that environment for more than a short distance. A few were seen in suitable (arid or semiarid) associations down to 5,000 feet, which probably is at, or near, the lower limit of their range. On May 8, the date of the first visit, a score or more birds were noticed flying back and forth across the perpendicular walls of the crater—birds whose bluebird manner of flight was perfectly familiar, and yet at the same time whose identity was a complete mystery. After considerable maneuvering and scrambling from one point of vantage to another one of the "familiar strangers" came within range. To van Rossem's utter disgust it proved to be nothing more than a Frantzius' elaeinia, the securing of which had taken up an hour or more of the only-too-limited time at the summit.

Possibly because of the press of feeding numerous half-grown young, no elaeenias were singing on Volcán de Santa Ana, though the common call-note was the most frequently heard sound on the top of this mountain.

Nesting.—On May 10, 1927, three nests were found tucked away in clumps of parasitic growth with which the trees, scattered at intervals over the prairie at the summit of Santa Ana, were covered. There were undoubtedly scores of nests in similar situations nearby, for, as above noted, the birds were exceedingly abundant. The three nests investigated were all in one small tree, which incidentally was also the home of several pairs of *Zonotrichia capensis*, and at least one pair of *Turdus rufitorques*. The crowding was possibly the result of a scarcity of suitable nesting sites, rather than actual colonizing. At this date the nests held in each case two half-grown young. The nests were rather loosely built of fine, gray grass and measured about four inches in outside diameter. They were not deeply cupped.

Plumage notes.—The eight birds taken at various times during the month of February are in absolutely fresh plumage, the wings and tail showing very little abrasion, while the May (breeding) birds are badly worn. However, there seems to be no difference of moment between fresh and worn birds, except that the fresh birds are more pronouncedly yellowish on the median underparts. There is obviously very little color change through wear.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; bill, brown, basal half of mandible, reddish flesh-color; tarsi and feet, brownish black.

***Elaenia viridicata placens* Sclater. PLACID FLYCATCHER.**

Elaínea placens Sclater, Proc. Zool. Soc. Lond., 27, p. 46, 1859—Córdova, Vera Cruz, Mexico.

Specimens collected.—Lake Olomega, 12; Barra de Santiago, 1; Puerto del Triunfo, 1; Cacaguatique, 1; Volcán de San Miguel, 1; Volcán de Conchagua, 1; Chilata, 1; San Salvador, 1; Sonsonate, 1.

Status.—Fairly common, generally distributed resident of wooded areas throughout the Arid Lower Tropical Zone. Extremes of elevation are sea level and 3,500 feet.

Remarks.—There is no intergradation with *E. v. accola* apparent in any of the specimens taken, those from the extreme eastern and western parts of the country alike being typical *placens*.

This species is typically an inhabitant of light, sunny, open forest, although it was also found to be not uncommon in the middle heights of the thick swamp forest at Puerto del Triunfo. It is a far more active member of the genus than are the other two local species and, unlike either of them, is often found in pairs, trios, or even four or five together. Fondness for company results in their being frequently found in mixed flocks of other small species. Some are almost certain to be with the vireos, tanagers, and ant-shrikes which accompany the vanguards of marching columns of army ants.

Plumage notes.—The postjuvenile molt includes only the body plumage. The central portion of the crown, including the yellow patch, is the last part of the juvenile plumage to be replaced. One specimen taken as late as December 4 is just completing the crown molt although the remainder of the body molt has long been finished and is already beginning to show some wear. The juvenile remiges and rectrices are retained through the first winter and probably until the first annual molt the following August. There is a limited spring body molt, chiefly about the head and interscapular region, but this is, as a rule, very inconspicuous.

Colors of soft parts.—Adults and fully grown juveniles: iris and bill, dark brown; tarsi and feet, dark plumbeous.

Stomach contents.—Small insects exclusively, 3.

***Camptostoma imberbe imberbe* Sclater. SOUTHERN BEARDLESS FLYCATCHER.**

Camptostoma imberbe Sclater, Proc. Zool. Soc. Lond., 25, p. 205, 1857—San Andres Tuxtla, Vera Cruz, Mexico.

Camptostoma imberbe imberbe van Rossem, Proc. Biol. Soc. Wash., 43, p. 129, July 18, 1930—El Salvador (crit.).

Specimens collected.—Lake Olomega, 5; Sonsonate, 1; Lake Channmico, 1; Puerto del Triunfo, 4; Río Goascorán, 1; Río San Miguel, 1.

Status.—Fairly common resident of the coastal plain and locally, where swampy conditions prevail, a short distance inland.

Remarks.—The junior author has previously affirmed the validity of *Camptostoma imberbe ridgwayi* and has restricted that name to the beardless flycatchers of southern Arizona and extreme northwestern Mexico. The characters of *ridgwayi* are slightly larger general size, decidedly larger bill, and slightly paler coloration. True *imberbe* extends northward on the Pacific coast at least to Nayarit and perhaps farther.

The thinly foliated, low, deciduous forest along the peninsula of San Juan de Goso was the only locality in which beardless flycatchers were at all common. There, in January, 1927, the sparse scrub along the lagoon contained a pair or more for every hundred yards of beach, and one was seldom out of sound of their sharp, piping call-notes. Although the very densest jungle is avoided, still, many were heard in the open, middle heights of the swamp forests about Lake Olomega, Puerto del Triunfo, and Rio San Miguel. In such places it is usually difficult to take specimens of this tiny, rather sedentary, and very inconspicuously colored flycatcher. Were it not for the sharp and unmistakable call-notes which draw one's attention, the species could be very easily overlooked.

Plumage notes.—The variation in the color of the crown seems to be individual and not due to age or sex, as supposed by Ridgway.¹ Some fully adult males which have completed the fall molt and are, therefore, more than one year old, have the pileum absolutely concolor with the back, and others (as certainly adult) have very dark, almost sooty crowns. The same is true of the females. An immature male in first winter plumage is average in color, that is, with the crown slightly, but obviously, darker than the rest of the upperparts.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; bill, dark brown, basal half of mandible, orange-flesh; tarsi and feet, dark plumbeous.

Stomach contents.—Insects exclusively, 3.

***Tyranniscus vilissimus vilissimus* (Sclater and Salvin). PALTRY FLYCATCHER.**

Elainia vilissima Sclater and Salvin, Ibis, 1, p. 122, pl. 4, fig. 1, 1859—Cobán, Vera Paz, Guatemala.

Specimens collected.—Hacienda Chilata, 5 (April 23 to 25, 1927).

Status.—Uncommon resident in the balsam association of the Arid Lower Tropical Zone.

Remarks.—The colony of *Tyranniscus vilissimus vilissimus* inhabiting the Balsam Range in El Salvador is probably wholly isolated, for in no other locality in the country was any trace of the species found. It affords still another instance, not only of the intrusion of an Atlantic slope species, but of the extreme localism of many species in the tropics, a fact which is continually impressed on those familiar with conditions, but difficult for a northerner,

¹ Bull. U. S. Nat. Mus., 50, pt. 4, p. 414, footnote, 1907.

accustomed to widespread forms, to realize. In spite of the isolation of the El Salvador colony, there appear to be no peculiarities in the five specimens taken, all of which are typical of the Guatemalan race.

These birds were found only in the balsam association along the crest of the range bearing the same name. The scattered balsam trees (*Toluifera pereirae*) are now component parts of the shade which covers immense coffee groves, and the birds were found indiscriminately in the various species of trees making up this cover. This little flycatcher is a species of the low treetops, for the specimens collected were taken at heights ranging from 20 to 50 feet from the ground. The call-note is surprisingly loud and cannot be mistaken for that of any other species.

Nesting.—The birds were in pairs, and both sexes were in breeding condition during the latter part of April. A female taken April 24 was certainly incubating, while another, which was nearly ready to lay, was shot on the 25th.

Colors of soft parts.—Adults: bill, iris, tarsi, and feet, brownish black.

***Mionectes oleagineus obscurus* (Dickey and van Rossem).**
SALVADOR MANGO FLYCATCHER.

Pipromorpha assimilis obscura Dickey and van Rossem, Proc. Biol. Soc. Wash., 38, p. 133, November 13, 1925—San Salvador, Salvador.

Pipromorpha assimilis assimilis Todd (not *Mionectes assimilis* Sclater), Proc. Biol. Soc. Wash., 34, p. 189, 1921—part, Salvador.¹

Pipromorpha oleaginea assimilis Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 5, p. 500, 1927—part, San Salvador.

Specimens collected. San Salvador, 4 (March 12, 15, April 1, 4, 1912); Barra de Santiago, 1 (April 4, 1927); Chilata, 7 (April 22 to 29, 1927).

Status.—Fairly common but extremely local breeder in the Arid Lower Tropical Zone. Detected from sea level to 2,300 feet.

Remarks.—The genus *Pipromorpha* Bonaparte has been quite generally recognized as distinct from *Mionectes*, chiefly because of the "normal" 9th primary of the former. Otherwise, the two so-called genera are very similar indeed. Examination of three subspecies of the type species (*Mionectes oleagineus*) of *Pipromorpha*

¹ Reference to the *Biologia Centrali-Americana* (Aves, 2, p. 22, 1888), Todd's authority for including El Salvador in the distribution of *assimilis*, fails to disclose any records for that country. Todd was undoubtedly misled by the custom of Salvin and Godman of "lumping" Honduras and El Salvador in their tables of distribution in their introduction.

shows that the 9th primaries of the *males* are decidedly narrower than the 8th and 10th. The difference between *Pipromorpha* and *Mionectes* is, therefore, only one of degree, scarcely more than specific, so that even as a subgenus *Pipromorpha* rests on a very slender foundation indeed. Todd, in his review of the forms of *Pipromorpha*, has already expressed doubt as to the advisability of according it generic recognition.

The race *obscurus* was originally described by the writers from four specimens from San Salvador. Parts of the description were carelessly worded, and Hellmayr, the latest reviser of the group, placed the race in the synonymy of *assimilis* in the belief that it was based on a single specimen only. Eight specimens collected subsequently bear out the characters originally designated. As compared with *M. o. dyscola* and *M. o. assimilis*, the El Salvador race is darker and duller green above and more brightly and purely (less greenish) ochraceous on the posterior underparts. Griscom¹ has shown that *assimilis* and *dyscola* are conspecific with *oleagineus*.

This species was first found to be not uncommon in the foothills about San Salvador, since four specimens were taken there in March and April, 1912. In this locality a very decided preference was shown for mango trees (*Mangifera indica*), so much so that the vernacular name mango flycatcher was at once suggested, particularly in view of the way in which the dark green and ochraceous coloration of the birds matched the foliage and fruit of the trees. It was 1927 before the species was again encountered, this time when a single bird was taken quite by accident, on April 4, in a dense, hanging curtain of vines in the swamp forest at Barra de Santiago. Later in the same month a nesting colony was found in the vine tangles draping the walls of a narrow ravine at Chilata. There is no doubt that this species is extremely spotty in its distribution. Whether it is permanently resident or occurs in El Salvador only as a spring and summer visitor, like the sulphur-bellied flycatcher and yellow-green vireo, is problematical.

Nesting.—Considering the rarity of this bird elsewhere in El Salvador, the extraordinary concentration of nesting pairs in one ravine at Chilata can be referred to only as a colony. This narrow canyon with its cascading stream and steep, vine-hung walls was also the location of the only nests of the black phoebe to be discovered in the country. In the hanging vines, usually over water, the long, pendant nests of *Mionectes* were hung, the intervals between

¹ Amer. Mus. Novit., 280, p. 9, September 10, 1927.

nests varying from a few feet to fifty yards. There was remarkable similarity in size and construction. They were all suspended from single, vertical, wire-like vine stems and were made of well-woven and packed grass, fine, flat, bark strips and weed stems. In length the nests were about fifteen inches, and in outside width at the nest chamber, five inches. The entrance was low down on the side at about the level of the chamber and not at the top as in the case of the orioles' nests, which those of *Mionectes* otherwise so closely resembled. The nest cup is situated near the bottom of the long, pendant nest and is about two inches wide by an inch and a half deep. Most of the nests were in varying stages of construction, but two held sets of three eggs each. They were both collected with the parents on April 28, 1927. The first set measures: 20×14.2 ; 19.7×14.5 , and 20×14.4 mm. The second measures: 20.1×14.2 ; 20×14.3 , and 19.2×14.4 mm. The eggs are immaculate, dull white.

It is evident that in at least two ways *Mionectes* has affinities with the *Cotingidae* rather than with the *Tyrannidae*, namely, in the (varyingly) abnormal ninth primary and also in the nesting, which is quite like that of *Platypsaris*, and certainly unlike that of any other flycatcher with which we are acquainted. However, *Mionectes* has a typically exaspidean tarsus which, of course, arbitrarily eliminates further consideration of the genus as a cotingid. Dr. Hellmayr, the latest reviser of the *Tyrannidae*, is inclined to believe that altogether too much emphasis has been placed on the character of the tarsal envelope in placing some genera in one family or the other. Nevertheless until a better method has been advanced one has no alternative but to use the existing means.

Colors of soft parts. Not recorded.

Family IIRUNDINIDAE. Swallows

Tachycineta thalassina lepida Mearns. NORTHERN VIOLET-GREEN SWALLOW.

Tachycineta lepida Mearns, Proc. Biol. Soc. Wash., 15, p. 31, March 5, 1902
- Campbell's Ranch, Laguna Mountains, San Diego County, California.

Specimens and records. Puerto del Triunfo, 3 (December 31, 1925; January 1, 1926); Los Esesmites, 3 (February 6, 20, 1927). Also noted at Los Esesmites (February 21 to March 10, 1927).

Status. - Abundant, though extremely local, midwinter visitant to the seacoast and mountains.

Remarks.—The abundance of this species at tidewater and in the interior mountains, with a vertical gap of some 6,000 feet in the distribution, cannot be explained at the present writing. In the winter of 1925–1926, violet-green swallows were to be seen in large numbers over the tidal flats at Puerto del Triunfo, where they fed from about an hour before sundown to dusk, in company with the even more common rough-wings. During the day they spread out over the coastal plain a short distance inland where their actual numbers were not so apparent. This was the only locality in which the species was detected until, in 1927, it was found to be extremely common above 6,000 feet on Los Esesmites. Here, flocks were seen daily from February 1 to March 10. On warm days they were usually circling back and forth over the cloud forest at 8,000 to 9,000 feet, but when, as was usual, that hunting ground was blanketed in wind-driven fog and clouds, they worked over the pines at 6,000 to 7,000 feet on the sunny, southern slope of the mountain.

All of the specimens taken are typical *lepida*.

***Iridoprocne albilinea* (Lawrence). MANGROVE SWALLOW.**

Petrochelidon albilinea Lawrence, Ann. Lyc. Nat. Hist. New York, 8, p. 2, May, 1863—Panama.

Iridoprocne albilinea Ridgway, Bull. U. S. Nat. Mus., 50, pt. 3, p. 90, 1904—La Unión; van Rossem, Trans. San Diego Soc. Nat. Hist., 6, No. 19, p. 268, 1931—El Salvador (crit.).

Tachycineta albilinea Salvín and Godman, Biol. Centr.-Amer., Aves, 1, p. 235, 1888—La Unión.

Specimens and records.—Lake Olomega, 8; Rio San Miguel, 1; San Sebastián, 7; Lake Channmico, 2; Lake Guija, 1. Also noted at Colima; Puerto del Triunfo. Recorded from La Unión.

Status.—Common resident on fresh-water lakes, ponds, and rivers below 1,500 feet in the Arid Lower Tropical Zone. The center of abundance is on the coastal plain.

Remarks.—This swallow was not found, even casually, away from the immediate vicinity of water. It is abundant about mangrove lagoons, the shores of lakes, and along river banks everywhere on the coastal plain and up to an altitude of 1,500 feet in the interior. Branches overhanging the water, stumps along shore, and poles set to mark the location of fish traps, are all perches which are sure to be crowded to the last available inch of space in the late summer months, when the already numerous adult population is augmented by the season's young of the year. Later on, in late fall and winter,

large assemblages are not common, for the birds soon pair off and spread into any suitable territory.

Nesting.—Although pairs frequently nested in close proximity, nothing which could be called colonizing was observed. Invariably the sites were in natural cavities or old woodpecker holes in trees standing in the water, or at least overhanging it. The mass nesting occurs in May, and young birds appear in large numbers about July 1.

A nest—the only one examined closely—which was found at Lake Channmico May 24, 1912, was composed of grass, soft-bark shreds, and rags, with the nest cup well padded with feathers and some horse hair. The site was typical, a leaning, dead tree trunk projecting over, and about three feet above, the water, and the nest was tucked well back into a rotted-out cavity near the tip. This nest contained three, partially incubated, pure white eggs which are not now available for measurement.

Plumage notes.—The postjuvénal molt, which includes remiges and rectrices, begins soon after the young are on the wing. A series of seven birds of the year taken at San Sebastián during the latter part of July vary from pure juvenal to nearly complete postjuvénal plumage. There seems to be no difference between young and old birds once the new fall plumage has been acquired.

It is notable that the dorsal plumage of this species is very much greener when fresh and becomes increasingly steely blue with wear and exposure. The change is a gradual one, but by the following spring little or none of the green tint remains. This color change is also observable, though to a decidedly lesser degree, in the allied *Iridoprocne bicolor*.

Colors of soft parts.—Adults: iris, dark brown; bill, tarsi, and feet, black. Juveniles: similar, but bill, tarsi, and feet, blackish brown.

Notiochelidon pileata (Gould). COBÁN SWALLOW.

Atticora pileata Gould, Proc. Zool. Soc. Lond., 26, p. 355, 1858—Guatemala.

Specimens and records.—No specimens. Noted at Los Esesmites (March 10, 1927).

Status.—Of rare spring occurrence (migrant?) in the higher portions of the cordillera.

Remarks.—On March 10, 1927, when en route to San José del Sacare, van Rossem saw four of these swallows flying about with a large flock of violet-greens at 7,000 feet on the mesa at Los Esesmites. The quick, fluttering flight and dark sides, under wings, and under

tail coverts made identity unmistakable. Unfortunately the guns were with the pack train, and the small collecting pistols failed to bring down a specimen.

Previous to this time passing flocks of violet-green swallows had carefully been scanned for this species, but none was seen between February 1 and March 9. Possibly this species is migratory and March 10 was the date of arrival in the vicinity. However, since Griscom¹ records specimens from Guatemala in December and January, the possibilities are that the birds seen on Los Esesmliles were residents in the vicinity.

Riparia riparia riparia (Linnaeus). BANK SWALLOW.

Hirundo riparia Linnaeus, Syst. Nat., ed. 10, 1, p. 192, 1758—Sweden.

Specimens collected.—Lake Olomega, 2 (September 4, 9, 1925); Divisadero, 1 (October 16, 1925).

Status.—Common fall migrant through the Arid Lower Tropical Zone.

Remarks.—The first bank swallows were detected at Lake Olomega on September 4, and the species became common two days later. They were noted as common at Divisadero September 28 and October 16, 1925, but none was seen thereafter.

Stelgidopteryx ruficollis fulvipennis (Sclater). CENTRAL AMERICAN ROUGH-WINGED SWALLOW.

Cotyle fulvipennis Sclater, Proc. Zool. Soc. Lond., p. 364, 1859—Jalapa, Vera Cruz, Mexico (type, a fledgling, examined by van Rossem in September, 1938).

Specimens and records.—Puerto del Triunfo, 8 (December 31, 1925 to January 21, 1926); Volcán de San Miguel, 7 (March 12 to 23, 1926); San Salvador, 3 (March 14, April 24, 1912). Also noted at Colima (January 21, 1927); Lake Olomega (August 29, 1925); La Palma (March 9, 1927); San José del Sacare (March 11, 1927).

Status.—Common resident of the Arid Lower and Arid Upper Tropical Zones. However, the species is confined during the breeding season to levels above 2,000 feet and during the winter to the lower country below 1,000 feet.

Remarks.—Of the eighteen specimens collected not one is unequivocally referable to the northern race, *S. r. serripennis*, although several approach it very closely. In consideration of the great variation present, even in breeding birds, there seems to be no

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 284, 1932.

alternative but to refer all of them to *fulvipes*. As Griscom¹ has correctly indicated in his recent review of the North and Central American races of *Stelgidopteryx ruficollis*, the differences between "*salvini*" [i.e., *fulvipes*] and *serripennis* are slight and require fair series to be properly appreciated. Our own survey of the two races, as based on the series in the Dickey collection, shows *fulvipes* to be slightly but definitely darker when birds of similar plumage are compared; the throat is more or less buffy, even in worn breeding specimens, and the under tail coverts are very frequently marked with dusky. The last-named character is present in ten of the eighteen *fulvipes* at hand, but in only one out of thirty-three *serripennis* from the western United States.

The rough-winged swallow shares with the blue honey creeper, rufous and white wren, and raven the distinction of being one of the very few species resident in El Salvador which has a vertical migration and which has different breeding and winter ranges. The first appearance of these swallows in the lowlands to be noted was at Lake Olomega on August 29, when several were seen flying over the lake. A few were noted on the Lempa River at Colima in January, but it is evident that the great majority go directly to the mangrove lagoons along the coast. At Puerto del Triunfo in late December, 1925, and January, 1926, hundreds were seen daily as they flew back and forth over the tidal flats in front of the town at sundown and over the swamp forest and mangroves during the day. The favorite roosting place was a group of small mangrove islands in the bay. About fifteen minutes after sundown the feeding birds stopped their crisscrossing of the tide flats and, after gathering into compact flocks, flew out to the mangroves for the night.

The return migration to the breeding grounds in the foothills and mountains takes place early in March.

Nesting. Immediately upon arrival at the nesting areas, sites are pre-empted and nest building begins. The very first arrivals to be noted at La Palma (March 9); San José del Sacre (March 11); Volcán de San Miguel (March 12); and San Salvador (March 14) were engaged in nest building when discovered. Sites occupied included old nest holes of the Texas kingfisher and Nicaraguan green paroquet (the latter in a vertical bank of volcanic ash), natural crevices in lava cliffs, and chinks between roofing tiles in native houses. Bark strips, grass, and feathers were the materials

¹ Proc. New Eng. Zool. Club, 11, pp. 67-72, 1929.

used in the few nests which were dug out, but all, unfortunately, were excavated too early in the season for them to contain eggs.

Hirundo rustica erythrogaster Boddaert. BARN SWALLOW.

Hirundo erythrogaster Boddaert, Tabl. Pl. Enl., p. 45, 1783—Cayenne.

Specimens and records.—Lake Olomega, 2 (September 6, 1925); Divisadero, 1 (October 4, 1925). Also noted at Lake Olomega (August 29, 1925); Rio Goascorán (October 26, 1925); San Salvador (April 11 to 19, 1912; April 22, 1926; April 27, 1927).

Status.—Common spring and fall migrant below 2,500 feet.

Remarks.—Barn swallows were first noted at Lake Olomega on August 29, 1925, but did not become common until September 6. At Divisadero they were seen in numbers until October 16. The last fall occurrence was at Rio Goascorán, when two were observed October 26. In the spring migration they appeared at San Salvador April 11, 1912, and were fairly numerous until the 19th. In 1926 they were noted commonly at that place on April 22, but had possibly arrived before that date, while in 1927, though about fifty birds were observed on April 27, none were seen at any other time.

Petrochelidon albifrons albifrons (Rafinesque). NORTHERN CLIFF SWALLOW.

Hirundo albifrons Rafinesque, Kentucky Gazette, p. 3, col. 4, February 14, 1822—Newport, Kentucky.

Specimen collected.—Colinas de Jucuarán, 1 (September 7, 1925).

Status.—Uncertain. Detected as a rare fall migrant on the Colinas de Jucuarán.

Remarks.—The relatively few cliff swallows which were collected afford but little clue to the relative abundance of the several forms. The following data refer to cliff swallows as a species, although they are of little value in the absence of subspecific determinations.

The first individuals were noted at Lake Olomega on September 4, 1925, and a few more on the 6th, but they occurred only as single birds in flocks of bank swallows. On September 7 a flock of approximately fifty cliff swallows was flying about over the grassy summit of the Colinas de Jucuarán, and from the fact that one *albifrons*, two *tachina*, and one *melanogastra* were collected from this assemblage, it seems probable that there was no decided predominance of any one subspecies. None were seen in this southeastern part of the country after September 9. In midwinter from December 31, 1925

to January 27, 1926, two or three cliff swallows were seen each evening as they fed with the swarms of rough-wings and violet-greens over the tidal flats at Puerto del Triunfo. Only one spring-migration flight was noted. At San Salvador on April 22, 1926, a mixed flock of about fifty barn swallows and one hundred cliff swallows flew back and forth over the city from sundown to dusk.

Petrochelidon albifrons hypopolia Oberholser. GREAT BASIN CLIFF SWALLOW.

Petrochelidon lunifrons hypopolia Oberholser, Canadian Field-Nat., 33, p. 95, 1919—Fort Norman, Mackenzie.

Specimens collected.—Divisadero, 2 (October 12, 16, 1925).

Status.—Fall migrant along the lower hill country.

Remarks.—The two specimens listed under this name are representative of the large, pale-colored, interior form. The wing of the single adult male measures 111.5 mm. and that of the young male 111 mm. The latter is, except for a few scattered feathers on crown, face, and interscapular region, still in juvenal plumage. Cliff swallows were noted as fairly common at Divisadero during October, and it is possible that the majority were, like the two collected, of the present race. If this be true, then *hypopolia* migrates somewhat later than the three other races passing through El Salvador.

Although the race *hypopolia* is not generally recognized it appears to us to be valid. In addition to the somewhat larger size (the largest of the races of *Petrochelidon albifrons*) it averages slightly paler. The rumps of the young are very different from those of the other forms, being pale pinkish, not brownish buff as in the other three. Its breeding range probably includes most of the Great Basin, south to Mono County, California. A breeding series from Mammoth, Mono County (Dickey collection) is definitely *hypopolia*.

Petrochelidon albifrons tachina Oberholser. LESSER CLIFF SWALLOW.

Petrochelidon lunifrons tachina Oberholser, Proc. Biol. Soc. Wash., 16, p. 15, February 21, 1903—Langtry, Texas.

Specimens collected.—Lake Olomega, 1 (September 6, 1925); Colinas de Jucuarán, 2 (September 7, 1925).

Status.—Detected only as a fall migrant in the extreme southeastern part of the country.

Remarks.—These three specimens possess the small size and buffy foreheads typical of the subspecies *tachina*. One of them, an

adult male, has just completed the annual body molt, while the wings and tail still bear the old worn feathers of the previous year. The other two are young of the year which are approximately half-way through the postjuvenile body molt.

***Petrochelidon albifrons melanogaster* (Swainson). MEXICAN CLIFF SWALLOW.**

Hirundo melanogaster Swainson, Philos. Mag., n. ser., 1, p. 366, May, 1827—Tableland of Mexico (= Real del Monte, Hidalgo).

Specimens collected.—Colinas de Jucuarán, 1 (September 7, 1925).

Status.—Fall migrant along the Colinas de Jucuarán.

Remarks.—The single specimen, typical of this race, was shot from a mixed flock of about fifty swallows which was flying about the summit of the Colinas de Jucuarán.

As we have no means of knowing whether Swainson intended to employ his specific name as an adjective or as a substantive noun, the frequently seen emendation (*melanogastra*) of the original spelling would appear to be unjustified.

***Progne chalybea chalybea* (Gmelin). GRAY-BREASTED MARTIN. GOLONDRINA (all species of swallows).**

Hirundo chalybea Gmelin, Syst. Nat., 1, pt. 2, p. 1026, 1789—Cayenne.

Progne chalybea Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 224, 1883—Acajutla.

Progne chalybea chalybea Ridgway, Bull. U. S. Nat. Mus., 50, pt. 3, p. 41, 1904—Salvador.

Progne leucogaster Baird, Rev. Amer. Birds, 1, p. 280, 1865—Acajutla.

Specimens and records.—Puerto del Triunfo, 5; Rio San Miguel, 3; San Salvador, 6. Also noted at Ciudad Barrios; Colima; Santo Tomás. Recorded from Acajutla.

Status.—Locally common resident in the Arid Lower Tropical Zone from sea level to 2,500 feet.

Remarks.—Gray-breasted martins have taken as kindly to civilization as have their northern relatives, and during the breeding season are to be found chiefly in the vicinity of towns and villages. There were, in 1912, 1925, 1926, and 1927, several colonies scattered about the city of San Salvador, where birds could be seen entering openings under eaves of some of the taller buildings. In that city also there was for several years, and probably still is, a populous martin roost in the trees over the band-stand in Parque Barrios, where the birds were in no wise disturbed by the nightly concerts.

In rural districts they congregate about the village churches, since such usually offer the most secure nesting sites. They were also observed, at Santo Tomás, to enter crevices under the roofing tiles of low, one-story buildings. After the breeding season there seems to be a general dispersal over the entire country within the limits of the Arid Lower Tropical Zone.

Nesting.—No nests were examined although many sites were noted. However, the condition of birds shot in mid-April indicates that eggs are laid soon after that date. On June 6 at Santo Tomás, parents were carrying what appeared to be large, winged insects into crevices underneath the roofing tiles of some houses along the main street.

Colors of soft parts.—Adults: iris, tarsi, and feet, dark brown; bill, black.

Family CORVIDAE. Crows and Jays

Cyanocitta stelleri lazula van Rossem. EL SALVADOR CRESTED JAY.

Cyanocitta stelleri lazula van Rossem, Auk, 45, p. 361, July, 1928—Los Esesmites, Chalatenango, El Salvador; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 65, 1934—El Salvador.

Specimens collected.—Los Esesmites, 11 (February 3 to 24, 1927).

Status.—Common in February and March, and presumably resident, in the oak-pine association and also in the cloud forest on Los Esesmites. The vertical range is from 7,000 to 9,000 feet.

Remarks.—This is the bluest of all the forms of the Steller jay. It is nearest to *C. s. ridgwayi* of Volcán de Fuego in Guatemala and to *C. s. suavis* of the Matagalpa region of Nicaragua¹ and, in common with them, possesses a prominent white mark on both the upper and lower eyelids. The differences between the three known Central American races of *Cyanocitta stelleri*, while obvious on direct comparison, are difficult to describe properly. The crest of *lazula* is very close to "deep dull violaceous blue" and is in abrupt and striking contrast to the glossy black of the postocular region; the streaks on the forehead are "pale cadet blue," darkening to "light cadet blue" on the forepart of the crown; interscapular region between "tyrian blue" and "dark tyrian blue"; rump and upper tail coverts "venetian blue."

¹ Miller and Griscom, Amer. Mus. Novit., 184, p. 7, September 24, 1925.

These jays occurred in fair numbers all through the higher oak-pine regions and in the cloud forest. In February and early March they were traveling about in small flocks composed of half a dozen or more birds, often, when in the oaks, accompanied by *Cissilopha* and once, in the cloud forest, by *Aphelocoma*. There seemed to be no differences in habits between these southern birds and their duller-colored relatives of the north. The flocks had the same exasperating habit, when pursued in relatively open pine timber, of mounting by short flights to the tree-tops and then flying off across a cañon at the first sign of closer approach. In the cloud forest, particularly on foggy days, one stood a far better chance of taking occasional specimens, for there they trusted more to concealment than to flight. It was certain that these small flocks did a vast amount of local traveling, for they were always on the move and not likely to be encountered more than once in the same place.

Nesting.—Breeding surely takes place later in the year than is the case with *Aphelocoma* and *Cyanolyca*, for up until March 8, at least, *Cyanocitta* was still in flocks and showed not the slightest signs of being ready to pair off.

Colors of soft parts.—Iris, dark brown; bill, tarsi, and feet, black.

***Aphelocoma unicolor griscomi* van Rossem. GRISCOM'S JAY.**

Aphelocoma unicolor griscomi van Rossem, Auk, 45, p. 362, July, 1928—Los Esesmiles, Chalatenango, El Salvador; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 59, 1934—El Salvador.

Specimens collected.—Los Esesmiles, 9 (February 5, 17, March 5, 1927).

Status.—Uncommon in February and March in the cloud forest of the Humid Upper Tropical Zone on Los Esesmiles. The vertical range is from 8,000 to 9,000 feet.

Remarks.—Although separated by some 700 miles in distance and by the interposition of the palest form of the *Aphelocoma unicolor* series, the El Salvador race bears remarkable resemblance to the dark *A. u. guerrenderensis* found in Guerrero, Mexico. When the characters of the *unicolor* series of jays are considered without regard to locality, there is not the slightest doubt that *coelestis*, *unicolor*, *griscomi*, and *guerrenderensis*, listed in order, with reference to relative darkness of coloration, constitute a graded series of geographic races of one species, and to express the fact it is necessary so to designate them systematically. However, when this series is arranged geographically, an entirely different picture is presented.

The two dark, purplish forms, *guerrerensis* and *griscomi*, are separated by the light, almost cerulean-blue *coelestis*. Moreover, while it is conceivable that actual intergradation may occur between *unicolor* and *guerrerensis* (although none has been shown to date) or even between *coelestis* and *griscomi* (which is even less probable) there can be none between *unicolor* and *coelestis* nor between *guerrerensis* and *coelestis*, for the Isthmus of Tehuantepec acts as an absolutely effective barrier for these high-mountain forms. The case is one in which nomenclature fails to convey a proper idea of relationships, whether one treats all four as specifically distinct or as races of one species.

Griscom's jay is, to date, known to occupy only the very limited area of cloud forest above 8,000 feet on Los Esesmites, though it certainly occurs in contiguous portions of Honduras and probably is generally distributed over the central highlands of that country. It was found only in the densest and darkest parts of the woods, and only by chance were occasional specimens picked up. The first birds met with were a small flock of five which, jaylike, came out of curiosity to a small campfire which was sending up a thick column of white smoke from the thickets of tree ferns. This was on February 4, 1927, a cold, windy day when the dense, driving fog made it almost impossible to see anything beyond a few feet. All five of these birds were shot. Four were males in breeding condition, and one was a female which would not have laid for some weeks. Two more males, one fully mature and the other a year old and not sexually mature, were found together in a ravine in the same type of forest on February 17. On March 5, a male and female, presumably a mated pair, were taken on the division between the humid cloud forest and the arid pine groves. These nine birds were all that were seen during the six weeks of collecting on Los Esesmites. The last two mentioned were with a flock of crested jays (*Cyanocitta*), and this was the only time when they were found consorting with other species.

There is no reason to suppose that the species is other than a permanent resident on Los Esesmites.

Plumage notes.—Birds in their first year may be distinguished by the shorter, more abraded, and duller-colored wings and tails and by the parti-colored mandible. One of these, collected February 17, is molting the old (juvenile) rectrices.

Colors of soft parts.—Adults: iris, dark brown; tarsi, feet, claws, and maxilla, black; mandible, black, obscurely streaked with bluish

horn-color. Immature male: similar, but mandible greenish yellow streaked with black.

Cyanolyca pumilo nigrogularis van Rossem. EL SALVADOR
BLACK-THROATED JAY.

Cyanolyca pumilo nigrogularis van Rossem, Auk, 45, p. 363, July, 1928—Los Esesmiles, Chalatenango, El Salvador; Hellmayr, Field Mus. Nat. Hist. Zool. Ser., 13, pt. 7, p. 49, 1934—El Salvador.

Specimens collected.—Los Esesmiles, 6 (February 26 to March 7, 1927).

Status.—Fairly common in February and March in the Humid Upper Tropical Zone on Los Esesmiles, where it breeds and is probably a permanent resident. The vertical range is from 7,800 to 8,700 feet.

Remarks.—This race is distinguished from *Cyanolyca pumilo pumilo* of western Guatemala and Chiapas by its decidedly larger size and by the color of the throat, the black of which extends, in the El Salvador race, down to the upper chest. The measurements of the three males of *nigrogularis* are: wing, 123–128 (126.3); tail, 126–129 (127.3). Those of the three females are: wing, 117–118 (117.7); tail, 120–121 (120.7).

Although found to be fairly common on Los Esesmiles, once it was discovered, this species, nevertheless, escaped notice entirely for the first four weeks of collecting. Instead of being a tree dweller and fairly conspicuous by its activity like *Cyanocitta* and *Aphelocoma*, it is a skulker in dense underbrush, vine tangles, and low second growth—just such an environment as is occupied by the catbird in the United States. Not one bird was heard to utter a single note of any kind, and their habit was to slip noiselessly away at the first hint of danger.

The first pair was taken on February 26 in a head-high, almost impenetrable tangle of brush and vines, covering what had once been a clearing in the forest. A flock of about ten was found in the native undergrowth in a narrow, heavily wooded ravine on March 5, and two were collected before the rest of the flock disappeared. On March 7 another pair was taken in dense undergrowth at the edge of a clearing.

It is likely that this jay, like most other members of the family, travels in small flocks except during the breeding season. Also it is probable that it is not so secretive once the breeding season is past.

Nesting.—Both of the pairs taken were breeding at the time they were collected on February 26 and March 7. The female taken on the latter date had obviously completed her laying several days before and was already beginning to show an incubation patch on the belly. An extended search through the tangle where she was shot failed, however, to disclose the nest. The two birds collected from the flock on March 5 would not have bred for some time although both were fully adult.

Colors of soft parts.—Adults: iris, dark brown; bill, tarsi, and feet, black.

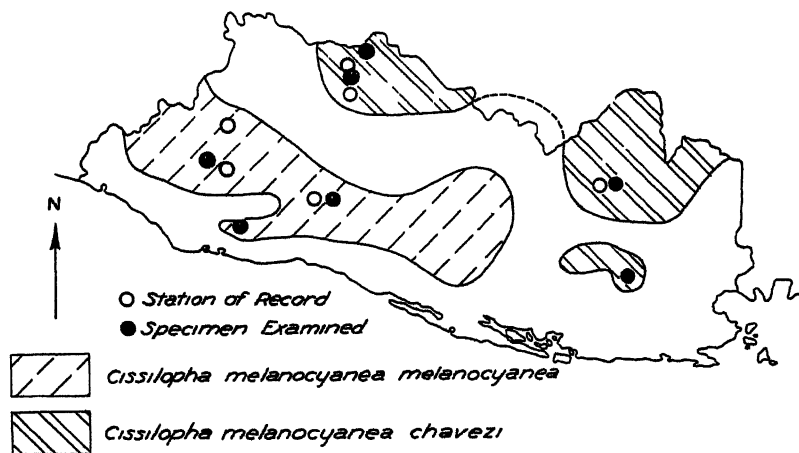


FIG. 19. Distribution of two races of the jay, *Cissilopha melanocyanea*, in El Salvador.

Cissilopha melanocyanea melanocyanea (Hartlaub).

HARTLAUB'S JAY.

Garrulus (*Cyanocorax*) *melanocyaneus* Hartlaub, Rev. Zool., p. 215, 1844—Guatemala.

Cissilopha melanocyanea Ridgway, Bull. U. S. Nat. Mus., 50, pt. 3, p. 317, 1904—Salvador (crit.).

Cissilopha melanocyanea melanocyanea Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 40, 1934—San Salvador.

Specimens and records.—Chilata, 5; Volcán de Santa Ana, 2; San Salvador, 9. Also noted at Volcán de San Salvador; 10 miles south of Lake Guija.

Status.—Common resident, principally of the Arid Upper Tropical oak association, from Volcán de Santa Ana east along the coastal ranges at least to San Salvador and probably to Volcán de San Vicente. The vertical range is from 2,000 to 5,000 feet (fig. 19).

Remarks.—The distribution of Hartlaub's jay coincides almost exactly with the districts and elevations in which coffee is grown, and in consequence this bird has had in great part to adjust itself to the substitution of coffee bushes for the original undergrowth. Oaks and other deciduous hardwoods formed most of the original forest, and although the thick leaf carpet from the coffee bushes now replaces the former oak leaves, it makes, apparently, an equally satisfactory mulch in which to work.

Hartlaub's jay approximates, in general habits, the California jay more closely than any other of the local species. When not prowling through the trees and bushes, it spends a great deal of time in working over fallen leaf litter. There is the same air of sly curiosity, the frantic excitement over trifles, and the furtive slipping through the foliage that characterizes the northern jays. Most of the year they drift about in noisy flocks, but once pairing starts in the spring they become silent, secretive, and far less conspicuous.

Nesting.—Breeding begins in late March, as was determined by the condition of specimens taken during that month. A nest found at 4,500 feet on Volcán de Santa Ana on May 7, 1927, was in a tangle of vines growing over the twigs and branches of the top of a fallen tree at the edge of the cloud forest. The nest was built of twigs of varying coarseness and lined with fine, curly, rootlike fibers. It held two young, probably not more than a few days old. Although probably three times the bulk of the eggs from which they came, they were absolutely featherless and the eyes were still unopened.

Plumage notes.—Like most, if not all, American jays this species retains the juvenal remiges and rectrices through the first year. By the following spring these show much more fading and wear than do the adult wing and tail feathers. An unfailing badge of immaturity is the parti-colored bill, which is extensively yellow basally in the young, and attains its solid black color only when the bird is a year old or more.

Colors of soft parts.—Adults, sexes alike: iris, bright, greenish yellow; bill, black; tarsi and feet, black, variously shaded or mottled with plumbeous. Immature, first winter, sexes alike: iris, dark brown; bill, yellow, terminal half of both maxilla and mandible and broad streak along culmen, black; tarsi and feet, plumbeous, rarely mottled with black. Immature, first spring: similar to first winter, but yellow of maxilla reduced to a dull streak on basal half of tomia

and basal half of mandible mottled with black and olive-yellow; iris, hazel with yellow flecks. Sharpe's notation "iris red"¹ is, of course, utterly wrong for any age.

Cissilopha melanocyanea chavezii Miller and Griscom. CHÁVEZ'S JAY.

Cissilopha melanocyanea chavezii Miller and Griscom, Amer. Mus. Novit., 184, p. 8, September 24, 1925—Matagalpa, Nicaragua.

Specimens and records.—Mt. Cacaguatique, 21; Los Esesmiles, 3; San José del Sacare, 2; Volcán de San Miguel, 3. Also noted at Ciudad Barrios; La Reina; La Palma.

Status.—Common resident of the oak and pine associations on Volcán de San Miguel and in the mountains along the Honduras border west at least to the Lempa River. The vertical range is from 2,500 to 8,000 feet (fig. 19).

Remarks.—It was only to be expected that the form of *Cissilopha melanocyanea* found along the cordillera would prove to be the same as that in the mountains of Nicaragua, rather than true *melanocyanea* of the western and central parts of the coast ranges. The close connection between the interior mountains of El Salvador and Nicaragua (unquestionably by way of the Honduran highlands) is reflected in other subspecies a few of which are *Dendrortyx leucophrys nicaraguae*, *Peucedramus olivaceus micrus*, and *Ailapetes gutturalis fuscipygius*. In the present case, the series of twenty-six skins from Mt. Cacaguatique, Los Esesmiles, and San José del Sacare is absolutely typical of *chavezii*, with topotypical examples of which they have been compared.

The range of variation to which this form is subject is well illustrated in the large series at hand. It includes occasional specimens which have a decided purplish hue above as well as below. A specimen from "Honduras" which shows similar tendencies has been commented upon at length by Ridgway² and by Miller and Griscom. In our opinion this purplish cast which is particularly evident on the dorsal surface, wings, and tail comes within the normal range of variation of *chavezii*. The amount of black below is extremely inconstant, some specimens having but little more black than *melanocyanea*, while in the extreme cases it extends backward medially over the underparts to the anal region. Only the flanks and under tail coverts of the blackest specimens are dull, dark, purplish blue,

¹ Cat. Birds Brit. Mus., 3, p. 134, 1877.

² Bull. U. S. Nat. Mus., 50, pt. 3, p. 317, 1904.

and even these parts contain several black feathers. The blue on the posterior underparts varies in the series from dark "prussian blue" and dull "azurite blue" to "dark aniline blue." Thus it will be seen that *chavezii*, while an excellently distinguished form, is, individually, an exceedingly variable one.

The intergradation point between *chavezii* and *melanocyanea* in the Oriente of El Salvador is Volcán de San Miguel. Of three specimens from there, one is typical *chavezii*, one is typical *melanocyanea*, and one is almost exactly intermediate, but can be nearly matched by the palest and most glaucous *chavezii* from Mt. Cacaguatique. On this slender basis the jays from Volcán de San Miguel are referred to *chavezii*.

Although a good part of the range of *melanocyanea* has been planted to coffee, that of *chavezii* has been little altered except for some patches on Mt. Cacaguatique and Volcán de San Miguel (pl. XXIII). It is clear that the natural habitat is in the oaks, and there the birds are confined, except for occasional wandering flocks which penetrate locally into the outer edges of the cloud forest on Los Esesmiles.

Nesting.—Breeding apparently takes place at about the same time as with *melanocyanea*; that is, it begins about March 15.

Colors of soft parts.—Exactly as in *melanocyanea*.

***Calocitta formosa pompata* Bangs. BANGS' MAGPIE-JAY.**

Calocitta formosa pompata Bangs, Proc. New Eng. Zool. Club, 4, p. 102, March 13, 1914—Bolsón, northwestern Costa Rica; Hellmayr, Field Mus. Nat. Hist., Zool. Ser. 13, pt. 7, p. 13, 1934—San Salvador.

Calocitta formosa azurca Dearborn (not of Nelson), Field Mus. Nat. Hist., Orn. Ser., 1, no. 3, p. 110, 1907—part, Salvador (crit.).

Specimens and records.—Barra de Santiago, 1; Lake Guija, 1; Sonsonate, 2; Lake Olomega, 2; Puerto del Triunfo, 2; Volcán de Conchagua, 5; Divisadero, 1; San Salvador, 5; Lake Ilopango, 2. Also noted at Lake Chanmico; Volcán de San Salvador; San Sebastián; Rio Goascorán; Ciudad Barrios; Volcán de San Miguel; Colima; La Palma; Volcán de Santa Ana. Recorded from "Salvador."

Status.—Common resident throughout the country, occupying practically every association and life zone between sea level and 5,000 feet.

Remarks.—The series of El Salvador magpie-jays is, in measurements, typical of the smaller race of northwestern Costa Rica. In color it is uniformly and distinctly paler and more grayish dorsally,

a circumstance which indicates that still another race will sooner or later have to be recognized. The eleven adult males from El Salvador vary in wing length from 183 to 194, and in tail from 233 to 284.

These big, crested magpies are the worst pests imaginable. They follow people through the woods, chattering and screaming, and if one is trying to slip up on some rare bird, the chances are that he will be discovered and everything within earshot warned into flight or hiding. If continued collecting is to be carried on in an area, it is sometimes a good plan to get rid of the most persistent and noisiest members of the flocks.

Although magpie-jays prefer open forest to very dense growth, there is seemingly no association or environment which is fortunate enough the escape their attention, until one gets above an altitude of 5,000 feet. A few were found in the lower edges of the cloud forest on the volcanoes of San Salvador and Santa Ana and in the oaks on Volcán de San Miguel. They were very numerous all through the oaks and pines at San José del Sacare and followed that association up the lower slopes of Los Esesmites above La Palma. Here, as elsewhere, they stopped at 5,000 feet although seemingly identical conditions extended up to 8,000 feet or more. In all of the coffee districts they are common, particularly about small villages and farms, nor is there any decrease in numbers in the lowlands, even in the mangroves and swamp forests.

Except during the breeding season one is most likely to find *Calocitta* in small, loose flocks of three or four or up to a dozen birds. It is probable that these assemblages are simply family parties, or groups of families, which stay together until the following mating season. The breaking up of flocks into pairs begins about March 1, and from then until the young are on the wing, these birds are much less noticeable than in the fall and winter months.

Nesting.—Pairing starts about March 1, and nesting must begin very shortly after that date, for a nest found April 16, 1912, contained three young, the largest of which was nearly ready to fly. The time probably varies with individual pairs, for a female which was certainly incubating was taken on Volcán de Conchagua March 1, 1926, and near San Miguel on April 5, 1926, a bird was seen carrying a streamer of dried grass into an isolated tree in a cotton field. The nest found, April 16, 1912, was in the topmost branches of a tall mango tree in a coffee grove near San Salvador. The body of the nest was heavy twigs and the lining was of finer material. It was quite bulky and measured a foot by a foot and a half across

the top. The cup was slightly oval, six inches by eight inches and four inches deep, though the young had probably enlarged it considerably from its original dimensions. The three young were of very different sizes. The largest was taken alive and escaped by flying away a few days later; the middle-sized one was but little smaller, while the runt of the brood was just breaking the pin feathers on the back and sides, and the wing and tail feathers were only about an inch long. All of these young were infested with maggots. The largest was host for two, the middle-sized bird had several and the runt eighteen. These maggots were from a half to three-quarters of an inch in length. They occurred in cysts just under the skin, principally about the belly and on the sides of the body under the wings, while one was in the eye socket of the smallest bird. It is possible that these parasites were responsible in great measure for the size variation in this brood.

Plumage notes.—The average sex difference in the series at hand is very pronounced. The females have much more black about the head, particularly on the crown, forehead, and crest. In some there is a broken orbital ring of black, and the superciliary stripe, post auricular patch, and chest band are more prominent than in the males. This distinction breaks down individually, but there is no doubt of the general trend.

There appears to be nothing exceptional about the molt sequence of this species. The juvenal remiges and rectrices are retained the first year, and the tail feathers especially become fearfully abraded before they are finally shed at the first annual molt.

Colors of soft parts.—Adults: iris, dark brown; bill, tarsi, and feet, black. Fully grown juvenile: iris, dark brown; bill, dark plumbeous; tarsi and feet, plumbeous horn-color. Half-grown juvenile (colors from dried skin): bill, dusky orange, darker on maxilla; tarsi and feet, dull, grayish brown.

Stomach contents.—The stomachs of two of three young birds taken from a nest contained nothing but mango pulp, so thinned down with the digestive juices as to be nearly liquid. Three adults contained fruit pulp or seeds, and one a single large (sphinx moth?) caterpillar. Although small birds display a great deal of animosity toward these jays, a circumstance which to say the least is suspicious, no evidence that they were guilty of nest-robbing ever came to notice. They are very partial to fruit, particularly to mangos, and eat a great many whenever they are available.

Corvus corax sinuatus Wagler. AMERICAN RAVEN. CUERVO.

C[orvus] sinuatus Wagler, Isis von Oken, 22, p. 748, 1829—Mexico.

Specimens and records.—Divisadero, 1 (October 4, 1925); Los Esesmites, 3 (February 6, 16, March 7, 1927). Also noted at Divisadero (September 27 to October 4, 1925); Monte Mayor (October 5 to 9, 1925); Mt. Cacagatique (November 19 to December 23, 1925); Volcán de San Miguel (March 18, 19, 1926); La Reina to La Palma (January 29, 1927); San José del Sacare (March 11, 1927).

Status.—Fairly common resident of the interior mountains and foothills from Los Esesmites eastward. Common also on Volcán de San Miguel. The raven occurs principally in the pine regions of the Arid Upper Tropical Zone, but in late fall and winter descends to the foothills. Extremes of altitude are 800 and 8,500 feet.

Remarks.—The four specimens collected are typical of *sinuatus*. The single male measures as follows: wing, 450; tail, 254; exposed culmen, 72. The three females have for the corresponding parts: 424–432; 223–233; 70.5–73. In color there is not an iota of difference between these specimens and a good series from the western United States and northwestern Mexico.

The range of the raven in El Salvador, except for a few pairs in the oaks on Volcán de San Miguel, is entirely along the interior mountains. The pine association of the Arid Upper Tropical Zone from some 3,000 feet to its upper limit at 8,500 is occupied throughout the year, but during the fall and winter many birds come down into the lower foothills to indulge in their time-honored occupation of pulling up young corn. About Divisadero (800 feet) and Monte Mayor (1,000 feet) numerous ravens were seen in September and October, 1925. They proved to be, like ravens everywhere, very difficult to shoot, and it was only after much effort and hours of hiding about lava buttes and such favored places that a specimen was finally taken at Divisadero. They were characteristically wary on Mt. Cacagatique, and although three or four pairs were often seen in the pines and oaks about the higher part of the mountain, not one ever came within gun range. The few pairs on Volcán de San Miguel occupy a local outpost away from the normal range. The upper slope of this mountain above the 2,700 foot contour, which marks the upper limit of the Arid Lower Tropical forest, is so obviously of the Arid Upper Tropical Zone that it is, after all, not very surprising that ravens have become established there along with a few other characteristic forms such as *Geococcyx* and *Salpinctes*. Their occurrence there in late March indicates permanent residence.

In the pines on Los Esesmites ravens were decidedly more numerous than anywhere else in El Salvador and were seen almost daily. There were at least a dozen pairs within a radius of five miles from the camp at 6,400 feet, and these were scattered at elevations of from 6,000 to 8,500 feet. Below 6,000 feet ravens were less numerous, but nevertheless were distributed generally all over the pine country down to about 3,000 feet. On Los Esesmites they were very much tamer than in other parts, possibly because the country is very sparsely populated and the birds suffer little or no persecution from what few people live there. At any rate, it was no uncommon thing for ravens to be seen about cattle corrals very close to the huts. A surprising occurrence happened on the night of February 16, 1927, a night of bright moonlight, when a raven, croaking loudly, flew over camp about nine o'clock and again about midnight. There was no mistaking the characteristic croaking and cawing, which without question were given by a raven.

Nesting.—On February 8, 1927, a pair of ravens was found working on a nest in the topmost branches of a forty-foot pine at an elevation of about 7,000 feet on Los Esesmites. The tree was one of a group of half a dozen growing on a bare ridge and was directly above a trail over which a dozen or more people traveled daily. This nest could be seen half a mile away and would have been conspicuous even without the presence of the builders, both of which were constantly arriving and departing. When first discovered only the base of the nest was in place, but it seemed to be completed shortly after the middle of the month. One of the birds was on the nest every morning after the 20th and would not leave until the tree was sharply rapped or a stick thrown into the branches nearby. This nest held five eggs on March 8, which were collected with the parent. The five eggs measure: 49.3×33.9 ; 49.2×43.4 ; 50.5×33.8 ; 50×32.1 , and 50.8×33.6 . They were typical in color and markings.

Colors of soft parts.—Adults: iris, dark brown; bill, tarsi, and feet, black.

Family TROGLODYTIDAE. Wrens

Troglodytes musculus oreopolus Chapman and Griscom.

MOUNTAIN HOUSE WREN.

Troglodytes musculus oreopolus Chapman and Griscom, Bull. Amer. Mus. Nat. Hist., 50, p. 287, 1924—Ocotál, Nicaragua (altitude 4,000 feet).

Specimens and records.—Volcán de San Miguel, 9; Mt. Cacagua-tique, 3; Los Esesmites, 2; San José del Sacare, 3; San Salvador, 1;

Volcán de San Salvador, 2; Chilata, 6; Zapotitán, 1; Volcán de Santa Ana, 2. Also noted at Santo Tomás.

Status.—Common resident of the mountains and higher foothills throughout the republic. The vertical range is from 1,800 to 8,500 feet and includes all zones and practically all associations.

Remarks.—The above series of twenty-nine house wrens extends the range of *oreopolus* northwestward nearly to the Guatemalan border, but because of the characters observable in some of the specimens from the extreme western parts of El Salvador, it is doubtful if the race will be found actually to occur in Guatemala.

The character of *oreopolus* is its darker and very much more reddish coloration when compared with *Troglodytes musculus intermedius*, which replaces it to the north and west. Specimens from Volcán de San Miguel, Mt. Cacagualique, and Volcán de San Salvador are absolutely typical *oreopolus* and cannot be distinguished from Nicaraguan topotypes. Those from Chilata, Volcán de Santa Ana, and Zapotitán are individually intermediate toward *intermedius*. In series, however, they are referable to *oreopolus*, by far the majority being unmistakably that form. Just as in the case of *Salpinctes* the determination of individual specimens from border-line localities is somewhat hazardous if not backed by series; intergradation is not a gradual blending, but shows almost beyond doubt a recent fusion of two forms. For example, one of the specimens from Volcán de Santa Ana is barely distinguishable from typical *intermedius*, while the other is typical *oreopolus*, and a larger series might show the *intermedius* strain to be predominant there. Of the six Chilata specimens, three are typical *oreopolus*, two might be called *oreopolus* slightly intermediate toward *intermedius*, and one is just about half-way between the two. In view of these facts, it seems likely that western El Salvador marks the extreme limits of *oreopolus* in that direction.

The manner of distribution of this race has been treated at some length by Chapman and Griscom¹ in their careful and comprehensive paper covering the "*musculus*" house wrens of the Americas. As these authors have shown, *oreopolus* is a highland form, which seldom descends in Nicaragua below 2,000 feet. A similar distribution is certainly true in El Salvador, since Santo Tomás and Zapotitán (1,800 feet) mark the very lowest limits at which the species was noted. It is of interest to observe that at Zapotitán, a locality in

¹ Bull. Amer. Mus. Nat. Hist., 24, pp. 279-304, October 4, 1924.

which swamp forest conditions prevail and which in general closely simulates the character of the coastal plain, house wrens were common and breeding. There would seem to be little doubt that eventually *oreopolus* will work its way down to the seacoast just as *intermedius* has done over most of its range.

The higher mountains (at present) constitute the true home of the race. Altitude is of far greater importance than zonal features, for there was no apparent difference in relative numbers at any locality above 2,000 feet. House wrens were found in native undergrowth, coffee groves, pine woods, oak groves, cloud forest, and even in the swamp forest. This distribution, while interesting, is by no means unique, since several other species, for example *Melozone biarcuatum*, have similar tendencies.

The name "house" wren is, for this subspecies at least, most inappropriate, for only rarely was it found near human habitations. At Santo Tomás, however, one was seen on the roofing tiles of a village house. The date, June 4, 1927, would indicate nesting, but even the mere presence of a bird in such a location is exceptional. Indeed it was the only instance when one of these wrens was taken within half a mile of a dwelling.

Nesting.—Small holes in vertical banks of soft earth, such as road-cuts, were the favorite nesting sites. Whether the holes were hollowed out by the birds themselves was not determined, but this seems to be not unlikely. The entrance was usually only large enough to admit the parents, and immediately behind it a roomy cavity was hollowed out, sufficient to accommodate the typical house-wren nest of twigs, grass, feathers, and the ever-present piece of cast-off lizard or snake skin. Once only was a nest found in a tree cavity. On Volcán de San Salvador a wren was flushed from a narrow crack on the under side of a tree leaning over a road, and this site was found, when investigated, to hold a nest which contained four eggs.

As indicative of the abundance of house wrens in favorable localities, may be mentioned the finding of eight occupied nests in the bank of two miles of road-cut which wound through the coffee groves on Volcán de Santa Ana. Of course, this may have been an exceptional concentration due to the very favorable location of the road, but even so it shows this wren to be, in certain localities, a very common bird indeed.

Eggs were found at Chilata April 6, 1927; Volcán de Santa Ana May 19, 1927; and Volcán de San Salvador June 1, 1912. A juvenile but recently out of the nest was taken at Zapotitán on June 18. A

total of five nests examined held, in every case, four eggs. A typical set taken at Chilata April 6, 1927, is white, with the ground color practically concealed by innumerable tiny markings and some larger spots of pinkish lilac and brick red. The eggs were very similar to eggs of the common house wren of North America. In size they measure: 17.7×13.6 ; 17.7×13.5 ; 18.1×13.8 , and 18.1×13.7 .

Plumage notes. The only molting specimen collected is one which was just finishing the postjuvénal molt on December 1.

Colors of soft parts.—Adults and juveniles: iris, dark brown; maxilla, blackish plumbeous; mandible, pale brown terminally, flesh color tinged with orange basally; tarsi and feet, pale brown.

Troglodytes rufociliatus rufociliatus Sharpe. RUFOUS-BROWED WREN.

[*Troglodytes brunneicollis*] Subsp. a. *Troglodytes rufociliatus* Sharpe, Cat. Birds Brit. Mus., 6, p. 262, 1881 Upper Chirostemon Forest, Volcán de Fuego, Guatemala (altitude 10,000 feet).

Troglodytes rufociliatus rufociliatus Dickey and van Rossem, Ibis, p. 265, April, 1929—Los Esesmites, El Salvador (crit.); Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 244, 1934—Los Esesmites (crit.).

Specimens collected.—Los Esesmites, 5 (February 9 to 23, 1927).

Status.—Fairly common resident of undergrowth in the cloud forest on Los Esesmites. The vertical range of this bird is from 8,000 to 9,000 feet.

Remarks. There are no obvious differences between examples of this race from such widely separated points as San Cristobal, Chiapas, Volcán de Santa María, Guatemala, and Los Esesmites, El Salvador. We have not, personally, examined the type of *rufociliatus*, but Gregory Mathews, to whom we sent typical specimens of both the El Salvador races, writes us that the type which is in the British Museum is close to the Los Esesmites birds, but that it may prove to belong to a distinct race. Regardless of whether further material shows that true *rufociliatus* is confined to Volcán de Fuego, there is little doubt that the rufous-browed wrens of Chiapas, northern Guatemala, and of northern El Salvador belong under the same name.

Troglodytes rufociliatus is very similar in appearance in certain details of structure to the winter wren (*Nannus*) of the north. It was found only in the darkest and dampest sections of the cloud forest, where there were plenty of moss-covered, fallen logs and considerable fern growth (pl. XIX). No collecting was done on Los Esesmites after March 8, but there is no reason to suppose that this

species is not a permanent resident on the mountain, for although not breeding so early in the year, the birds were always in pairs and males were singing.

Although found in the same general locality with *rufociliatus*, *Troglodytes musculus oreopolus* occurred chiefly in the more open, sunny exposures and clearings, and it is probable that the two species seldom come into actual contact.

Colors of soft parts.—Not recorded.

***Troglodytes rufociliatus nannoides* Dickey and van Rossem.**
SANTA ANA WREN.

Troglodytes rufociliatus nannoides Dickey and van Rossem, Ibis, p. 265, April, 1929—Volcán de Santa Ana, El Salvador; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 245, 1934—Volcán de Santa Ana.

Specimens collected.—Volcán de Santa Ana, 9 (May 7 to 17, 1927).

Status.—Fairly common inhabitant of the undergrowth in the cloud forest on Volcán de Santa Ana and its spurs.

Remarks.—The race of rufous-browed wren developed on Volcán de Santa Ana differs from the typical *T. r. rufociliatus* in its darker and duller coloration and its more extensively and more blackish barred flanks.

The distribution of *nannoides* seems to be confined to the Humid Upper Tropical Zone cloud forest on the north slope of the main cone and such minor peaks as are really a part of the same mountain, and is continuous from 5,000 to 7,000 feet. As elsewhere noted, the habitat of the species is in the densest and darkest sections, preferably where there is a plentiful supply of moss-covered, fallen trees and logs. A certain cypress grove at about 6,000 feet on the northeast slope of the mountain, and which adjoined a deep ravine choked with fallen timber and fern growth, was a particularly favored spot. Into this grove no direct sunlight ever entered, and even at midday the light was so dim and of such a peculiar, blue-green quality that it was difficult to see small birds at any distance at all. The quality of the light was precisely like the pseudo-dusk accompanying a total or nearly total eclipse of the sun. In this perpetual twilight there lived several pairs of rufous-browed wrens, a few Dearborn's robins, and an occasional nightingale thrush, but no other species ever penetrated more than a few feet inside the borders. The wrens were very much at home everywhere in this grove, and as many as three males were heard giving their "winter wren" song at the same time.

Nesting.—All of the seven males collected in May were in breeding condition, and the two females taken on May 8 were nearly ready to lay.

Colors of soft parts.—Not recorded.

***Thryothorus modestus pullus* (Ridgway). CHIAPAS WREN.**

Thryophilus modestus pullus Ridgway, Proc. Biol. Soc. Wash., 16, p. 167, November 30, 1903—Huehuetán, Chiapas.

Pheugopedius modestus pullus van Rossem, Trans. San Diego Soc. Nat. Hist. 6, p. 208, 1930—El Salvador (crit.).

Thryothorus modestus pullus Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 168, Dec. 1934—El Salvador (crit.).

Specimens and records.—Puerto del Triunfo, 4; Lake Olomega, 4; Colinas de Jucuarán, 1; Divisadero, 3; Volcán de San Miguel, 3; Mt. Cacaguatique, 2; Volcán de Conchagua, 2; Los Esesmiles, 3; Sonsonate, 2; Lake Chanmico, 3; Volcán de San Salvador, 1; Recorded from "Salvador."

Status.—Common resident of undergrowth from sea level to 6,500 feet. Occurs chiefly in the eastern, central, and northern parts of the republic in both the Arid Lower Tropical and Arid Upper Tropical zones. Its apparent absence from the extreme western departments indicates a break in the distribution of the subspecies.

Remarks.—Although, as above stated, there appears to be a definite break in range continuity, we are unable to detect the slightest difference between specimens from El Salvador and Chiapas. The race, although variable individually, holds its characters in fairly stable fashion over its entire range. The deeper, more brownish coloration is the only reliable color character by which to differentiate *pullus* from the typical race of Costa Rica, for the tail barring is too variable in width to count for much.

We find it impossible to recognize any generic differences between such closely related forms as *Thryothorus*, *Thryophilus*, and *Pheugopedius*. The latest monographer¹ merges all three of these "genera" into *Thryothorus*, a proceeding with which we are in complete accord.

There is little to characterize the habits of this wren which, like its local congeners, is an inhabitant of underbrush and vine tangles throughout its range. If there be any difference in general habits, it is that *pullus* is perhaps confined more exclusively to situations

¹ Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, pp. 153-209, Dec., 1934.

close to the ground and does not often mount into the trees to sing, like *rufalbus* and *pleurostictus*. The song is typically wrenlike in character, more like that of *Thryomanes bewickii* than of any other species with which it has been personally compared. Like many other brush-haunting small birds this one occasionally was caught in mousetraps set on the ground or in low bushes. The bait on these traps was invariably oatmeal or cornmeal, but probably a search for insects attracted by the bait was the cause of such captures, rather than the bait itself.

Nesting.—This species is a late breeder. Juveniles were taken from July 28 to September 28. One just out of the nest was obtained August 7.

Plumage notes.—Adults taken October 14 and November 3 have only just started the annual molt, thereby closely paralleling *Heleodytes capistratus*. The material, although abundant, does not include molting juveniles so it is not possible to outline the plumage changes. As in other local wrens, there is no discernible spring molt.

Colors of soft parts.—Adults: iris, bright, reddish brown; tarsi and feet, slaty lilac or bluish slate; maxilla, dark brown; mandible, pale, plumbeous blue. Juveniles: iris, dark brown; tarsi and feet, pale plumbeous; mandible, flesh color.

***Thryothorus rufalbus rufalbus* Lafresnaye. RUFOUS AND WHITE WREN.**

Thryothorus rufalbus Lafresnaye, Rev. Zool., 8, p. 337, 1845 "Mexico" (= Guatemala).

Specimens collected. Puerto del Triunfo, 2 (January 2, 24, 1927); Barra de Santiago, 1 (April 6, 1927); Volcán de Santa Ana, 3 (May 6 to 12, 1927); Volcán de San Salvador, 2 (May 31, June 2, 1912); Chilata, 1 (April 28, 1927); Volcán de San Miguel, 3 (March 21, 1926); Volcán de Conchagua, 1 (February 25, 1926).

Status.—Fairly common resident of densely wooded areas from 2,000 to 6,000 feet in the coastal highlands. It occurs during mid-winter and spring in the jungles along the coast, but possibly is not resident there.

Remarks.—There are slight but fairly constant differences between eastern and western specimens of this species. Those from Volcán de San Miguel and Volcán de Conchagua are a little paler dorsally, have wider wing and tail bars, and are slightly darker gray below. These differences probably indicate an approach to the race *castanotus* Ridgway of Nicaragua and Costa Rica.

The rufous and white wren is a resident of the coastal ranges the full length of the country, but seems to be entirely absent from all interior points. Two hypotheses may be advanced to account for the presence of midwinter and spring birds at sea level; first, that the range is divided vertically like that of *Wilsonia pusilla chryseola* in California, where one group occupies the lowlands and the other the high mountains; second and more probable, that there is a downward movement of some individuals in the winter. At any rate, not one rufous and white wren was met with at any season at any point between sea level and 2,000 feet, although collecting was done in several localities where, had these wrens been present, they would surely have been detected.

In midwinter they were rather common in the huiscoyol palm undergrowth in the heavy jungle at Puerto del Triunfo. The specimen taken at Barra de Santiago was not in breeding condition in spite of the rather late date. It is obvious that deep woods are preferred to open growth, whether at the coast or in the mountains. On the volcanoes of Conchagua, San Miguel, San Salvador, Santa Ana, and at Chilata, these wrens were common in deep ravines which were well shaded and grown with ferns and other small growth, but only seldom were they found in the oak undergrowth or coffee groves.

There are two common call-notes. One is a typical scolding note, with little or nothing to distinguish it from the scolding notes of small wrens in general, which was heard only in spring and summer in the mountains; the other a sharp, castanet-like chattering, heard only during the winter. The song is decidedly not very wrenlike—a series of astonishingly deep, not unmusical hoots which may be written “who-o-o-o-who-who-who-who-who.” One’s instant thought on first hearing it is “owl.” Like the songs of some other forest birds (*Catharus* for one) it is very deceptive as to distance. Instead of being fifty yards away, the bird will usually be found within a few feet, hunched over with the body nearly horizontal and the throat puffed out to an almost grotesque size. During the breeding season it is not difficult to decoy males by whistled imitations of the song.

Nesting.—Dissection of specimens showed that the breeding season extends from the latter part of March at least until the first of June.

Colors of soft parts.—Adults: iris, dark brown; maxilla, light, plumbeous blue; tarsi and feet, bright, plumbeous blue.

Thryothorus pleurostictus oblitus (van Rossem). SCLATER'S BANDED WREN.

Phlegopedius pleurostictus oblitus van Rossem, Bull. Mus. Comp. Zool., 77, No. 7, p. 399, Dec. 1934—Barra de Santiago, Ahuachapán, El Salvador.

Specimens collected. Barra de Santiago, 2 (April 3, 13, 1927).

Status.—Uncommon in April (probably resident) in the lowlands in the extreme southwestern corner of the country (fig. 20).

Remarks.—Only two examples of this race were collected, both of which were taken in the undergrowth of the swamp forest at Barra de Santiago. The measurements of these specimens (both males) are: wing, 65–67; tail, 54–56; exposed culmen, 16.3–17.3; tarsus, 21.1–21.4. The larger size, together with the duller and more brownish (less rufescent) dorsal coloration, at once distinguishes *oblitus* from *lateralis* of the Oriente and the Lempa drainage basin. There seems to be a wide gap in the south-central departments from Miraflores to Barra de Santiago in which no form of the species *pleurostictus* occurs, for extensive collecting at such favorable points as Lake Channmico, Zapotitán, Sonsonate, and Chilata, failed to produce a single specimen.

Thryothorus pleurostictus lateralis (Dickey and van Rossem). EL SALVADOR BANDED WREN.

Thryophilus pleurostictus lateralis Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 3, January 8, 1927—Lake Olomega, El Salvador (and other localities cited below); Miller, Condor, 34, p. 15, 1932—Lake Olomega. *Thryophilus pleurostictus* Salvin and Godman (not *Thryothorus pleurostictus* Sclater), Biol. Centr.-Am., Aves, 1, p. 86, 1880—part, Volcán Conchagua.

Thryophilus pleurostictus pleurostictus Ridgway, Bull. U. S. Nat. Mus. 50, pt. 3, p. 629, 1904—part, Volcán de Conchagua.

Thryothorus pleurostictus rarus (not *Thryophilus pleurostictus rarus* Ridgway), Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 181, Dec., 1934—part, El Salvador (crit.).

Specimens and records.—Lake Olomega, 14; Volcán de Conchagua, 4; Puerto del Triunfo, 1; Divisadero, 2; Rio Goascorán, 1; Miraflores, 1; Lake Guija, 2. Recorded from Volcán de Conchagua; Lake Olomega, etc.

Status.—Common resident of the eastern lowlands west to Miraflores coastwise and northwestward up the Lempa Valley to Lake Guija. Also occurs commonly on Volcán de Conchagua, but apparently on no other mountains (fig. 20).

Remarks.—The race *lateralis* is one of the lowland forms which characterize the San Miguel faunal district of southeastern El Salvador.

The average measurements of nine adult males of *lateralis* are: wing, 62.7; tail, 49.2; exposed culmen, 15.8; tarsus, 20.9; middle toe minus claw, 14.7.

It is with some hesitation that the two specimens from Lake Guija are included here, for they are just about intermediate toward *oblitus*. One skin is closer to *oblitus*, the other to *lateralis*, and a series would be necessary to determine which name would be most applicable.

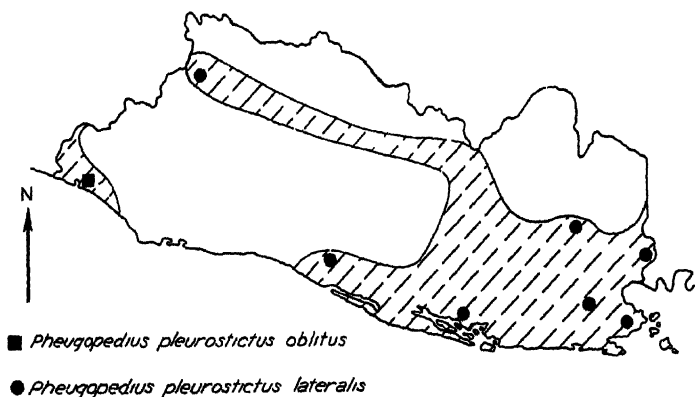


FIG. 20. Distribution of two races of the wren, *Phuegapedius* (= *Thryothorus*) *pleurostictus*.

The banded wren is, like other members of the genus, a brush-haunting species, but perhaps, as a general rule, occupies a slightly higher foliage level than *pullus*. It was not unusual to find them with flocks of vireos, warblers, and other small birds, feeding through the top foliage of low trees, particularly in places where undergrowth was thin or wanting. The song is exceptionally fine and is without doubt the peer of any of the local wrens in sweetness and volume. Carriker¹ states that the song of the Costa Rica race, *ravus*, is much inferior to that of *Thryothorus castaneus*, in which case the latter must be a very wonderful songster indeed.

Nesting.—Three nests which were occupied by this species were found about Lake Olomega in July and August, 1925, but that these were built by the wrens themselves is open to question. In our own

¹ Ann. Carnegie Mus., 6, p. 757, 1910.

minds they were none other than deserted nests of the earlier nesting flycatcher, *Tolmomyias sulphureus cinericeps*, a bird which was common in the same locality. At Lake Olomega on July 30, 1925, a female banded wren was seen to enter such a nest which was swung to the tip of a branch thirty feet above the ground, while the male sang continuously in the nearby foliage. On August 30, a nest containing a single white egg, cracked and with contents dried, was found, and because of the disturbance raised by a pair of wrens, it was supposed that the nest—the familiar elbow-shaped structure—belonged to them. Later on the same day still another nest was investigated because of frequent entrance by wrens and was found to contain a half-grown young wren and a cracked, dried-up, white egg. It is entirely possible that these old white eggs were simply relics of former occupancy by the flycatchers, if it be actually the case that the nests were originally built by those birds. However, an egg ready to be laid, contained in a female wren taken July 31, was pure white.

The nests (see also under *Tolmomyias*) were pendant from the tips of slender branches and varied in height from about six feet to thirty feet from the ground. They were woven of fine, black, hair-like material (probably aerial rootlets), with the entrance through a downward projecting funnel almost as long as the nest itself, and the walls of the whole affair so thin that the contents could be seen from without. It seems incredible that two such widely different species would build identical nests, and there is little doubt in our own minds that *Tolmomyias* was the builder (and original occupant) of all of them. If this be true, it is an exceedingly interesting case of interrelationship, and the very late nesting of this particular wren may be an adjustment to follow the breeding season of the flycatcher.

A juvenile just out of the nest was collected August 6, 1925, and another, full grown but in absolutely fresh plumage, on November 3, 1925. These two juveniles probably represent extreme early and late nestings. Females taken on July 31 and August 5 were laying.

Plumage notes.—Like most of the resident wrens, *lateralis* molts very late, the annual molt of adults taking place in late October and November.

Colors of soft parts.—Adults and juveniles alike: iris and maxilla, dark brown; mandible, flesh color, usually tinged with bluish; tarsi and feet, varying from light brown to horn color.

Thryothorus maculipectus varians (Griscom). PACIFIC
SPOTTED-BREASTED WREN.

Pheugopedius maculipectus varians Griscom, Proc. New Eng. Zool. Club, 12, p. 7, April 13, 1930—San José, Guatemala.

Specimens collected. Lake Olomega, 2; Puerto del Triunfo, 6; Chilata, 2; Mt. Cacaguatique, 1; Zapotitán, 1; Lake Chanmico, 3; San Salvador, 2; Miraflores, 1; Barra de Santiago, 1.

Status.—Common resident of the Arid Lower Tropical Zone throughout the Oriente and west along the coastal slope to the Guatemala border.

Remarks.—Griscom in his recent review of the races of *Pheugopedius* [= *Thryothorus*] *maculipectus* has decided that *umbrinus* is confined to the Caribbean slope of Guatemala and western British Honduras. While the present writers have had no opportunity to make a critical comparison of *umbrinus* with *variens*, they can state definitely that birds from southwestern Chiapas and El Salvador are identical with those from western Guatemala and that the range of *variens*, therefore, extends along the Pacific coast from southwestern Chiapas at least to El Salvador.

This wren has a rather peculiar distribution, for although found nearly everywhere between sea level and 3,500 feet in the Oriente and all along the coastal slope to the border of Guatemala, it is apparently absent entirely from the whole of the interior west of the Lempa River. Not a trace of it was noted at such points as Colima, Lake Guija, or San José del Sacare.

Spotted-breasted wrens in habits are typical members of the family, haunting vine tangles and low shrubbery at all seasons.

Plumage notes. The only specimens in molt are two adults which were collected at Lake Olomega on September 12 and 13, respectively. Both of these have nearly finished the annual molt. This indicates a molt some six weeks or two months earlier than in most of the resident wrens.

Colors of soft parts.—Adults: iris, brownish red; maxilla, brownish black or blackish plumbeous; tomia, pale blue; mandible, tarsi, and feet, plumbeous blue.

Henicorhina leucophrys capitalis Nelson. GRAY-CROWNED WOOD
WREN.

Henicorhina leucophrys capitalis Nelson, Auk, 14, p. 74, January, 1897—Pinabete, Chiapas, Mexico.

Specimen collected.— Los Esesmites, 1 (February 26, 1927).

Status.— Uncommon (resident?) in the deep forest undergrowth of the Humid Upper Tropical Zone on Los Esesmites.

Remarks. The single specimen collected appears to be absolutely typical of this form, with the type of which, in the collection of the *Biological Survey*, it has been compared.

When shot it was working through the deep ground-litter of dead oak leaves near a small mountain stream at 8,000 feet, burrowing mouse-like for some distance under the leaves and reappearing for an instant in the most unexpected places. Another bird with it was presumably its mate.

Colors of soft parts.— Male adult: bill, black; tarsi and feet, dark, plumbeous brown; iris, dark brown.

***Heleodytes rufinucha capistratus* (Lesson). HOODED CACTUS WREN. HUALCALCHÍA.**

Picolaptes capistrata Lesson, Rev. Zool, 5, p. 174, 1842—Realejo, Nicaragua.

Campylorhynchus capistratus Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 64, 1880—part, Acajutla and La Unión.

Heleodytes capistratus capistratus Ridgway, Bull. U. S. Nat. Mus., 50, pt. 3, p. 504, 1904—(cit. of above); van Rossem, Condor, 16, p. 14, January, 1914—El Salvador; Miller, Condor, 34, p. 15, January, 1932—Lake Olomega (nesting).

Heleodytes rufinucha chiapensis (not *Campylorhynchus chiapensis* Salvin and Godman) Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 145, 1934—part, El Salvador.

Specimens and records.— Lake Olomega, 5; Rio San Miguel, 1; Hacienda Miraflores, 2; Divisadero, 3; Volcán de San Miguel, 1; Puerto del Triunfo, 3; Hacienda Zapotitán, 1; Sonsonate, 3; San Salvador, 10; Barra de Santiago, 4; Lake Guija, 11. Also noted at Hacienda Chilata; Mt. Cacaguatique; Volcán de San Salvador; San Sebastián; Rio Goascorán; Volcán de San Miguel; San Miguel; Colima. Recorded from Acajutla; La Unión; Lake Olomega.

Status.—Very common resident everywhere from sea level to the extreme upper limit of the Arid Lower Tropical Zone and, locally, even into the Humid Upper Tropical as high as 4,500 feet.

Remarks.—Specimens from the central and northwestern parts of the country show unmistakable tendencies toward *rufinucha*. In some instances the crissum is heavily spotted or barred, and occasionally there are traces of spots on the breast and flanks. The peculiarities shown by individual El Salvador specimens, particularly from the

region about Lake Guija, leave little doubt that *capistratus* and *rufinucha* should be regarded as conspecific. The individual variation is such that it is possible to find individuals like typical *capistratus* in the same localities with the spotted birds. Judging from the remarks of Sharpe¹ "Guatemalan" specimens are even more intermediate in character, and Ludlow Griscom has characterized and named a race, *Heleodytes capistratus xerophilus* from Progreso, Guatemala,² which links *capistratus* with *rufinucha*. Although some of the Lake Guija specimens could be referred satisfactorily to *xerophilus*, the preponderance of characters in the series as a whole makes it advisable to call them *capistratus*. Coastwise, typical *capistratus* extends to the Guatemalan boundry at least, specimens even from Barra de Santiago showing no approach to *nigricaudatus*.

Just what names are to be used for the several races of *Heleodytes rufinucha* must be determined by a thorough specific revision. Hellmayr's action in applying Salvin and Godman's name of *chiapensis* to the race on the Pacific coast of Guatemala is, however, incorrect. I have examined the type of *Campylorhynchus chiapensis* and cannot possibly associate, racially, this very large cactus wren (known only from the type specimen) with any other species.

The common cactus wren of the Pacific slope of southern Central America is by no means confined to such narrow associational limits as is *Heleodytes brunneicapillus* of more northern regions. On the contrary, there is no brushland or forest anywhere within the Arid Lower Tropical Zone, except portions of the swamp forests where little or no undergrowth can exist, from which it is absent. The species is perhaps most numerous in the lower foothill region and least so in the higher country above 3,000 feet. On the coastal plain it is exceedingly common nearly everywhere. Cultivation has undoubtedly increased the former range materially, for under primitive conditions it is most unlikely that the species would have reached any such altitude as 4,500 feet. Its occurrence there today is simply the result of the clearing of the forest and the conversion of the land into corn-fields, coffee groves, and other low growth.

The hooded cactus wren has benefited by human occupancy of its breeding area as much as has any species of small bird in the country. It is the only one which commonly and regularly nests about city parks, shade trees, patios, and even in hanging fern baskets in the outer corridors of houses—a strange reversal of form surely,

¹ Cat. Birds Brit. Mus., 6, p. 191, 1881.

² Amer. Mus. Novit., 414, p. 7, March 24, 1930.

when one considers how intolerant of altered conditions are the cactus wrens of the northern deserts. The desire for protection from natural enemies which has drawn numbers of these wrens into cities is reflected just as strongly in the suburbs and about villages and outlying haciendas, all of which have numerous pairs living in the shrubbery close to the houses or even, just as in town, nesting in any available sites in the corridors and patios.

Under primitive conditions all sorts of low growth is favored, but perhaps mimosa and acacia thickets are the most so. At Puerto del Triunfo none was found in the heavy forest, but wherever a break in the continuity of the woods permitted low growth to exist, there was certain to be a pair or more of cactus wrens. They were not uncommon in the mangroves and, of course, were present everywhere about the deserted town, the abandoned plantings of fruit trees, and in the thorny scrub of old pastures. On both Volcán de Santa Ana and Volcán de San Salvador a few pairs were resident about buildings and, in smaller numbers, had invaded the lower edges of the cloud forest at 4,500 feet. Oddly enough, although ranging so widely and filling every possible niche in the Arid Lower Tropical Zone, the species seems to be totally absent from the pine region everywhere. In fact, not a single individual was found in the Arid Upper Tropical Zone in any environment whatever.

The song is by no means musical; in fact, is very much otherwise, and consists of series of what can only be called "gobbles," which are delivered with much enthusiasm, but which nevertheless are extremely irritating to the average human ear. The reunion of a pair of birds which has been separated for a few minutes is always cause for an outpouring of several seconds' duration, as both birds go through their unmusical repertory with outspread tails and quivering wings.

Nesting.—The nests are the familiar, loose heaps of grass, rags, plant down, and feathers common to the genus and appear not to differ in any respect from the structures of *Heleodytes brunneicapillus*. They are most frequently purse-shaped, with the entrance on the side, and are packed to suffocation with feathers. There is really no such thing as a "typical" site. During many months in the field, literally hundreds of nests were observed, some in the thorny mazes of mimosa and acacia trees, others in orange trees, in garden shrubbery, tucked behind pendent palm fronds, in hanging fern baskets, in forks of dead or living trees, behind dislodged roof tiles, and even in drain spouts. In fact, any situation between six and thirty feet

above the ground which will serve for a nest site, is as likely as not to support one. The family custom of building dummy nests is as highly developed in this species as in any. The proportion of occupied nests to dummies is about one to eight, but seems to vary with different pairs. Not a few keep on building nests throughout the year, and nest building may very well, by anyone not familiar with this habit, be erroneously construed as breeding. Whether any of these nests are used as sleeping quarters is problematical. At any rate the wrens go in and out of them all day long and make a great to-do if any are investigated.

The earliest layings probably do not take place until early in March. The normal period is at its height in April, May, and June, and though occasional sets may be found as late as the middle of July, that date is not common. Whether more than one brood a year is raised is questionable. Family groups stay together from the time the young are on the wing until the following spring, and the young are cared for so conscientiously that there would seem to be little time for a second batch. As illustrative of the care the young receive, there may be cited the case of a fully grown brood, several months old, which still followed the parents about and frequently was being fed by them. The date (February 23) would make these young six or seven months old at the very least.

The eggs have a white, or slightly buffy-white, ground color and are heavily sprinkled with small markings of various shades of brown and lilac. On some eggs the markings are evenly distributed, on others they appear in the form of a distinct wreath, but generally there is simply a pronounced coalescence of markings about the larger end. The color differences between various sets consist chiefly in variations in the relative amounts of brown, purplish, and lilac spotting. The eggs vary in number from three to six, with sets of four and five most commonly found. A typical set of five eggs collected at Chilata on April 26, 1927, measures 20.5×15.1 ; 20.1×15.4 ; 20.5×15.5 ; 21.1×15.1 , and 20.7×15.2 . Another of four eggs taken at Chilata on April 30, 1927, is slightly larger and in measurements is 21.8×15.9 ; 21×16.3 ; 21×15.7 , and 21.5×16 .

Plumage notes.—Although numerous specimens were collected, they were not taken at times which allow the molt sequence to be definitely stated. The annual molt occurs later than in most resident passerines, for it had just commenced in several birds taken the first week in October, and is usually not completed until about

mid-November. There appears to be no spring molt in the adults at least.

Colors of soft parts.—Adults: iris, brownish red, dark crimson, or orange-brown; maxilla, black; mandible, pale, plumbeous blue with tomtia and tip, black; tarsi and feet, plumbeous. Juveniles: similar, but iris, dark brown.

Stomach contents.—Small insects exclusively, 4. This species not infrequently has the forehead and face stained with purplish juice, indicating that fruit or berries are sometimes eaten also.

Salpinctes obsoletus guttatus Salvin and Godman. EL SALVADOR
ROCK WREN.

Salpinctes obsoletus Salvin and Godman (not *Troglodytes obsoletus* Say), Biol. Centr.-Am., Aves, 1, p. 71, 1880—part, Volcán de Conchagua (4,000 feet); A. O. U. Check-list of North Am. Birds, ed. 2, p. 296, 1895—Salvador; Brewster, Bull. Mus. Comp. Zool., 41, p. 199, 1902—part, "San Salvador."

Salpinctes guttatus Salvin and Godman, Ibis, p. 609, October, 1891—Volcán de San Miguel (4,000 feet); Ridgway, Bull. U. S. Nat. Mus., 50, pt. 3, p. 656, 1904—part, Volcán de San Miguel; Volcán de Conchagua?

Salpinctes guttatus guttatus Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, pp. 25–28, March 5, 1927—Volcán de San Miguel; Colinas de Jucuarán; Volcán de Conchagua.

Salpinctes obsoletus guttatus Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 297, 1923—in text, El Salvador (crit.).

Specimens and records.—Volcán de San Miguel, 26; Volcán de Conchagua, 5; Colinas de Jucuarán, 13. Also noted at San José del Sacare. Recorded from Volcán de San Miguel; Volcán de Conchagua; Colinas de Jucuarán.

Status.—Common resident of the Arid Upper Tropical Zone of the volcanic mountains in the extreme southeastern portions of the country; also of apparently rare occurrence in the cordillera.

Remarks.—Since the writers discussed the relationships of the spotted rock wrens, additional material has been collected which necessitates a nomenclatural rearrangement. Ludlow Griscom has demonstrated, from the characters displayed by the series of rock wrens from Guatemala in the Dwight collection, that *guttatus* is a race of *obsoletus*, to which it is connected by the transitional form *S. o. neglectus* Nelson.

Rock wrens in El Salvador are confined entirely to the Arid Tropical Zone. On Volcán de San Miguel, the locality in which they were most numerous, they were common all over the old lava

flows extending down to about 3,000 feet or even lower. The following notebook extracts show these birds to differ little in habits from the common rock wren of the north: "The species prefers the newer flows with plenty of large blocks scattered about. The comparatively old flows where crevices have been filled up more or less with earth, ash, and grass roots, leaving only the tips of the larger blocks projecting, are not attractive to them. Neither are the smooth mudflows good places. What they like best are the recent flows where the lava, cooling rapidly, has been forced up into ridges, rough-surfaced and with numberless cavities. This type of ground is difficult to get over, but there is no alternative if one wishes to take more than an occasional specimen. There is such a piece of ground right above the ranch house, extending from 2,700 feet upward to about 5,000. Above the latter point the slope is so broken with gullies and holes that it is practically impossible to get about at all. No wrens were seen above 4,100 feet at this place. The area is about half a mile wide at the bottom, tapering to a point at the top. Grass has become established here and there where a little soil has had a chance to accumulate. In this place about ten pairs of rock wrens were found, most of them with young on the wing. In life these wrens look very much larger than *obsoletus*, but have identical, chirring call-notes, song, and manners. One wonders what becomes of these birds when the volcano is active enough to put out a heavy ash fall, for there have been many such even in the recent history of the mountain. In 1919 for instance, the whole mountain was treated to a shower of ashes, in places three feet deep. The ashes were not hot, for rain poured continuously during the eruption, but they were chemically powerful enough to destroy vegetation, and practically all small life must have been killed also."

There being no rough flows to speak of on the summit of Volcán de Conchagua and on the crest of the Colinas de Jucuarán, the wrens there live mostly about the more or less isolated lava boulders cropping out here and there above the mat of grass roots. On the summit of Conchagua there is a long, stone wall, and here several birds were seen although they were so adept at disappearing through the cracks that only two were taken along its entire course.

Rock wrens, questionably of this subspecies, were seen January 29, 1927, and again about the middle of March along a stone wall and about boulders in the pines near San José del Sacare. This was the only place where they were observed anywhere along the interior mountains. None was seen except near this one wall, which un-

fortunately was right in a small village where no specimens could be collected. Other places nearby, apparently ideally suited for the needs of this species, were carefully searched but with purely negative results. It is clear that in El Salvador the population center is on the southeastern volcanic mountains.

Nesting.—The single nest which was found was discovered on Volcán de San Miguel, purely by accident, at dusk on the evening of March 22, 1926. A rock wren, subsequently determined to be a female, was seen bobbing and chirring in characteristic fashion on a lava boulder on a grass-grown mudflow. She flew to a small, flat rock some distance away and just barely discernible in the dusk. "On my arrival at the rock the bird was nowhere in sight, and I was just thinking that she had probably slipped away when she flushed right at my feet. I stooped over and could see the edge of the nest about six inches back from the small entrance hole. Fortunately the stone over the nest was easily lifted. The site was under a flat stone balanced on some smaller stones lying on the surface of a smooth mudflow. The entrance was on the downhill side and was merely a small hole about $1\frac{1}{2}$ inches wide and an inch high. Behind the opening a small cavern had been cleared out of the soft earth and ashes. There was no indication of a stone paving such as our northern species is supposed to construct, but numerous small pumice pebbles and flakes had been dumped just outside the entrance. I wonder if at least a part of the stone work attributed to the northern bird is not in reality only the heavier part of the sweepings from the nest cavity and passage? The nest itself was built of soft, fine grass—a rather well-matted pad placed in a scratched-out hollow in the loose soil. The rim was only slightly above the soil level. Mixed with the grass of the cup were a few small pieces of cottony plant-down." Unfortunately the four eggs were ready to hatch and only one of them could be saved. This is dull white with numerous small, reddish brown specks about the larger end, chiefly in the form of a wreath. It measures 19.8×16.1 mm.

It is certain that nesting begins much earlier than the date of this set (March 22), which is probably a second laying. By far the majority of pairs at this time were accompanied by young on the wing, which varied in size from bob-tailed birds just out of the nest to fully grown juveniles whose plumage already had begun to show some wear. Adults taken on Volcán de Conchagua the last week in February and the first week in March of the same year were, however, not nearly ready to breed at that time.

Plumage notes.—Juveniles taken on the Colinas de Jucuarán as late as September 7 have only just commenced the postjuvenile body molt. Adults from the same locality show the annual molt to commence about August 1, and a specimen taken September 7 is in practically complete, fresh, fall plumage. There is no spring molt discernible in numerous specimens taken between February 26 and March 26, and it seems likely that none normally occurs. *Salpinctes* is noteworthy as being by far the earliest molting local species of wren, for it has finished the annual molt long before *Heleodytes* and the various species of *Thryothorus* have even commenced.

Colors of soft parts.—Adults: iris, dark brown; bill, blackish brown, basal half of mandible, pale bluish; tarsi and feet, blackish brown to slaty black. Juveniles: similar, but tarsi, feet, and maxilla, brownish plumbeous; mandible, flesh color, dusky at extreme tip.

Stomach contents.—Tiny insects exclusively, 11.

Family MIMIDAE. Mockingbirds and Thrashers

Mimus gilvus gracilis Cabanis. CENTRAL AMERICAN MOCKINGBIRD.

Mimus gracilis Cabanis, Mus. Hein., 1, p. 83, footnote, 1851—Honduras¹

Specimen collected.—San Salvador, 1 (March 11, 1912).

Status.—Uncertain, but probably a resident in limited numbers on the plains of central Chalatenango. Escaped cage birds are sometimes to be seen in or about the larger towns such as San Salvador, Santa Ana, and San Miguel.

Remarks.—In a wild state mockingbirds undoubtedly exist in some numbers on the stony, arid plains which stretch from the Lempa River north to the foothills of the cordillera. The characteristic growth on this sterile ground is the “cuchara” tree (*Crescentia*). Several odd days spent at various points on this plain, mostly along the road, or rather track, running from the Lempa River at Colima, to La Reina in the foothills, failed to produce so much as the glimpse of a single mockingbird. It is, however, from this district that most of the caged mockers so often seen in the towns are said to come.

It is only to be expected that some of these semidomesticated pets escape from time to time and, until recaptured or killed, continue to live about the places where they were previously confined.

¹ For use of the name *gracilis* see van Rossem, Bull. Mus. Comp. Zool., 77, no. 7, p. 400, Dec., 1934.

Such a bird was shot at San Salvador on March 11, 1912, as it was dodging about in a wild pineapple hedge near the edge of the city. Both wings had recently been clipped, showing that it had escaped a relatively short time before.

Melanotis hypoleucus Hartlaub. BLUE AND WHITE
MOCKINGBIRD.

Melanotis hypoleucus Hartlaub, Rev et Mag. Zool, 4, p. 460, October, 1852
—Guatemala

Specimens collected.—Mt. Cacaguatique, 1 (November 30, 1925); Los Esesmiles, 10 (February 4 to March 3, 1927); Volcán de Santa Ana, 3 (May 8, 10, 1927).

Status.—Fairly common resident of the Arid Upper Tropical Zone of the cordillera and Volcán de Santa Ana. The vertical range is from 3,500 to 8,000 feet.

Remarks.—The blue mockingbird is characteristically a bird of the underbrush of the oak-pine association, and in that environment it was met with as a common bird on Los Esesmiles. On the summit of Santa Ana—the only spot in the coastal range where the species was encountered—it was of fairly common occurrence in the thorny scrub and low, bushy oaks about the rim of the crater. The Humid Upper Tropical Zone is utterly unsuited to these birds, and none was ever found in the cloud forest.

The general habits of these birds are very much like those of the thrashers of the north. They are rather inquisitive and, though not particularly shy, their custom of sticking close to thick scrub renders them very inconspicuous unless especially sought. Their usual method of escape is to slip quietly away, but if hard pressed they will often make short flights from bush to bush, alighting a few feet short of the objective point and racing, thrasher-like, the last few feet to the protecting cover. The bold, contrasting, color pattern is distinctly of the "disruptive" type, and in the vivid light and shade of the birds' normal haunts is actually concealing. It is only rarely that single birds are met with; pairs, trios, or small flocks being usual. It seems not improbable that pairs are the rule so far as adults are concerned and that the one-year-old birds stay in groups, at least during the first winter. On one occasion a pair of these birds was noted in company with a small flock of Hartlaub's jays.

Nesting.—The single nest discovered was found May 10, 1927 in a thicket of scrub oak at the summit of Volcán de Santa Ana. Over and through many of these bushes grew almost impenetrable snarls

of blackberry vines, and in a very dense tangle the nest was hidden. The site was nine feet from the ground and very difficult to reach with no support firmer than small branches and vines. A few coarse twigs made up the body of the nest. The lining was of fine curled rootlets, and the whole structure was so thin that the eggs could be plainly seen from the ground below. Both parents were present, but even here they were silent and showed their anxiety only by slipping quickly back and forth through the foliage at little more than arm's length. The two eggs, in which incubation had started, measure 27×19.2 and 26.2×19.1 . In color they are about half way between "lumier blue" and "bremen blue," immaculate and unglossed.

Plumage notes. —Although no molting specimens were collected, it is obvious on the most casual examination that the adult plumage is not attained the first year. On Los Esesmiles in February and March three males, all immature, were taken from small flocks numbering up to six birds. These young birds have a pronounced creamy tinge on the underparts; the blue of the upperparts is duller than in adults; the remiges and rectrices are decidedly shorter and narrower. By May these juvenile wing and tail feathers are fearfully abraded, while those of the adults are still comparatively fresh. That one-year-old birds sometimes breed is shown by the taking of a male with a set of eggs on Volcán de Santa Ana on May 10, 1927. On the other hand the young males taken in late February on Los Esesmiles had the testes completely dormant, although adults were showing considerable activity by that date. Fully adult males average about 113 mm. in wing and 133 in tail, while four one-year-old males average about 105 and 125, respectively. There is no spring molt discernible in any of the adults, but one of the year-old specimens, taken February 23, has several new feathers in the nape. These may be replacements of lost feathers and not a regular molt, however.

Colors of soft parts. —Adults: iris, crimson; with bill, tarsi, and feet black.

Family TURDIDAE. Thrushes

Turdus rufigitorques Hartlaub. RUFOUS-COLLARED ROBIN.

Turdus (Merula) rufigitorques Hartlaub, Rev. Zool., p. 214, 1844—Guatemala.

Turdus rufigitorques Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 354, 1934—El Salvador.

Specimens collected.—Volcán de Santa Ana, 21 (May 8 to 17, 1927).

Status.- Abundant summer visitant and probably a permanent resident in the limited area of Arid Upper Tropical Zone on the summit of Volcán de Santa Ana. The vertical range is from 7,000 to 7,200 feet (fig. 21).

Remarks. There are no differences apparent between the series taken from the isolated colony on Volcán de Santa Ana and specimens from Guatemala and Chiapas. The species is, individually, an extremely variable one, scarcely two examples being exactly alike.

Of all the local species of robins, *rufitorques* most closely resembles the familiar *T. migratorius* of the north, not only in general appearance but in call-notes, song, and nesting. The relationship between the two is very close, and it is obvious that, although specifically distinct, they are relatively recent divergences from a common origin.

The range of the rufous-collared robin in El Salvador is confined to the summit of the main cone of Santa Ana. This limited area is an undulating prairie dotted with isolated trees and agave plants. It is occupied chiefly by other birds of Arid Upper Tropical affinities. The division between forest and prairie is well defined and relatively abrupt, for the woods of the cloud forest stop at 7,000 feet altitude. When one visits the summit, almost the first birds to be noticed are the rufous-collared robins hopping about on the green grass beneath the trees. The similarity of the females and young males to *migratorius* is so startling that at first sight one rubs his eyes in amazement. However, the brilliant, flashing, black and brick red, old males at once dispel any illusion of identity. These latter are relatively rare and, as if conscious of their conspicuousness, are so wild that special effort must be made to secure specimens. The eight collected represent three days of effort, in which time a hundred females and one-year-old males might easily have been taken if desired.

Nesting. Several nests, which varied greatly in situation, were found on each of the days of May 8, 10, and 17, 1927. Some were in the forks or triple crotches of dead trees and hence in plain view from some distance, others were in forks of living trees, well concealed in foliage, while still others were planted more or less firmly in clumps of arboreal parasitic plants. Regardless of the site, they were all essentially similar in structure and were duplicates of the nests of *migratorius*, except that cow manure instead of mud was used for the sublining. On the dates given above many young, still bob-tailed and only just on the wing, were in evidence. They were all of approximately the same size, which indicates that nesting starts simultaneously among the greater part of the local population. Second

layings commence about the middle of May, for several incomplete nests on which the parents were working were found on May 10. At that date a single set of three pipped eggs was taken from a nest discovered, more or less by accident, in a dense clump of arboreal ferns growing from one of the lower branches of an isolated tree. Two of these eggs were broken in preparation. The third measures 29.8×21.6 mm. In color and shape it is identical with the eggs of *migratorius*.

Plumage notes.—The spotted juveniles differ from *migratorius* of similar age only in the ground color of the underparts and the spotting on the wings and upperparts, in all of which particulars they are more

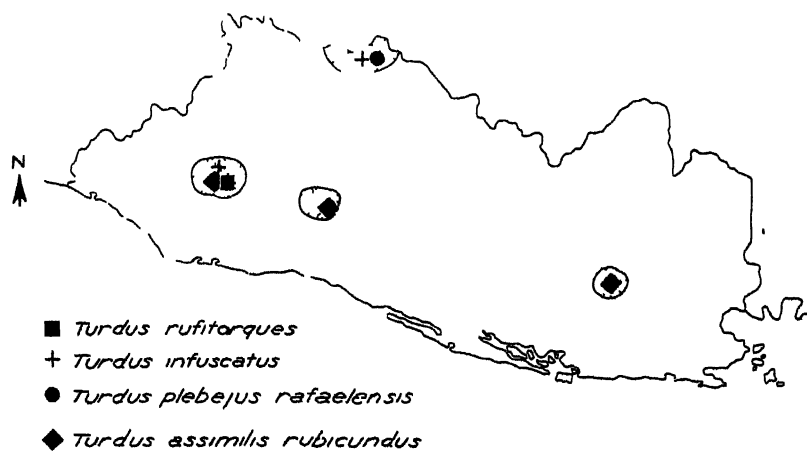


FIG 21. Distribution of four species of thrushes of the genus *Turdus* in El Salvador.

buffy. The spots across the nape are larger than in *migratorius* and indicate the rufous collar of later life, but otherwise the young of the two species are very similar indeed. The dorsal spotting on the upperparts of the single juvenal male is very much more prominent than in the two females.

Neither males nor females reach maturity the first year. One-year-old males are similar to fully adult females, but average darker throughout and usually, but not always, have the collar brighter-colored. One-year-old females are very much duller and less reddish than adults. Some of them lack any red tinge whatever on the chest, and the nuchal collar is ill-defined and not very different in color from the crown and upper back. There is some difference in size between one-year-old birds and adults. Part of this dissimilarity is no doubt due to the fact that the juvenal quills of the wing and tail

are retained the first year. These, like the juvenal quills of practically all species, abrade rapidly and hence show much more wear than do adult feathers. Four one-year-old males measure: wing 121 126; tail, 90 96; eight adult males: wing, 130 140; tail, 100 110.

There is a great amount of color variation in eight males which are certainly more than one year old, that is, in those which have passed the first annual (first postnuptial) molt. Four have the underparts, posterior to the lower breast (exclusive of the under tail coverts), uniformly black, sharply defined against the brick red of the foreparts; one has a trace of red on the central abdominal region; two have a large amount of red mottled into the black; and one is red from throat to under tail coverts, with the portions which are usually solidly black merely lightly mottled or streaked with brownish sooty. The color of the throat varies, irrespective of the amount of black on the underparts, and ranges from fine, black, shaft streaks on a rufous ground to an almost solidly black throat, the feathers of which are edged with rufous. Most of the specimens of both sexes show a spring molt takes place about the foreparts and interscapular region.

Colors of soft parts.—Adult males: bill, tarsi, and feet, bright yellow-orange; iris, dark brown. One-year-old males: bill, tarsi, and feet, dull yellow-orange; iris, dark brown. Females, adults and one-year-olds alike: bill, tarsi, and feet, light orange-brown; iris, dark brown. Juveniles: similar to the females, but bill extensively brown, paler on basal half of mandible.

***Turdus assimilis rubicundus* (Dearborn). DEARBORN'S ROBIN.**

Planesticus tristis rubicundus Dearborn, Field Mus. Nat. Hist., Orn. Ser., 1, no. 3, p. 137, 1907 Patulúl, Sololá, Guatemala.

Turdus assimilis rubecundus [sic] Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 306, 1932 northern (i.e., western) El Salvador.

Turdus assimilis rubicundus Miller and Griscom, Amer. Mus. Novit., 184, p. 11, September 24, 1925 Salvador (crit.); Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 361, 1934 Volcán de San Miguel; Volcán de Santa Ana; Volcán de San Salvador.

Turdus leucauchen Sharpe (not of Sclater), in Seeböhm's Monogr. of the Turdidae, 1, p. 223, 1902—part, Volcán de San Miguel.

Specimens examined.—Volcán de San Salvador, 6 (May 30, June 2, 1912); Volcán de Santa Ana, 3 (May 8, 17, 1927); Volcán de San Miguel, 2 (March 30; April 5, 1891).

Status.—Uncommon resident in the Humid Upper Tropical forests on Volcán de San Salvador, Volcán de Santa Ana and, formerly at least, on Volcán de San Miguel (see fig. 21).

Remarks.— Just how to treat the local race of *Turdus assimilis* nomenclaturally is as much of a problem at the present writing as it was in 1925 when Miller and Griscom wrote their review of the geographical forms of this species. From the writings of these authors one finds that in western Guatemala there occur olive-colored birds practically indistinguishable from *assimilis* proper and along with them relatively reddish ones which have received the name of *rubicundus*. The same state of affairs exists on Volcán de San Salvador and Volcán de Santa Ana. Of the six specimens from Volcán de San Salvador, five are distinctly of the *rubicundus* type while one resembles *assimilis*. All three from Volcán de Santa Ana, on the other hand, are unmistakably of the *assimilis* type, in fact, one of these latter is so slaty above that were it from an intermediate locality it would be considered an intergrade between *assimilis* and *leucauchen*. Both of the Volcán de San Miguel birds are typical *rubicundus*. In this variation it is absolutely certain that neither age nor sex play any prominent part, for although the series consists of but eleven specimens, it shows both olive and reddish types occurring in the young and old of each sex.

As Miller and Griscom have pointed out, it will not do to call the olive-colored birds of western Guatemala (and El Salvador) *assimilis*, separated as they are by the very different *leucauchen*. They are here treated as variants of *rubicundus*, which name, although based on a reddish-colored bird, should probably apply to all of the *Turdus assimilis* population of the region under discussion.

These robins are confined to the cloud forests on the only two peaks of the coastal range where they were encountered by us. Even here the distribution was not general, but was confined, for no apparent reason, to certain very limited sections. On Volcán de San Salvador there was a local assemblage of possibly a dozen pairs in an uncut area of original forest just above the coffee finca "Granadillas" on the northwest slope of the mountain. This particular spot was at an elevation of 4,500 feet and near the lower edge of the limited area of cloud forest. At no other place on Volcán de San Salvador were any Dearborn's robins seen, although the reason for their absence was not apparent. On Volcán de Santa Ana several pairs were always to be seen or the males heard singing in a planted cypress grove on the northeast slope of the main mountain or else in the woods at the upper and lower edge of the grove. The altitudinal limits were in this case from 5,500 to 6,500 feet, although the steepness of the slope made the distribution more vertical than horizontal.

The manner of occurrence on Volcán de San Miguel is unknown to us. We did not find it there in 1926. Richardson took two males (examined by us) in 1891, but ecologic conditions have undoubtedly changed considerably since that time, and the species may now be extinct on the mountain.

The song is typically "robin" but is short and consists of few notes. The flight and mannerisms are also typical of the group, but the alarm note is very different from that of any thrush with which we are acquainted. It resembles nothing so much as the croak of a small frog (*Hyla*) and, although this curious croak was often heard in the cypress woods, it was some time before it was finally associated with the robins.

Nesting.— Three males, one adult and two of the previous year, which were taken on Volcán de Santa Ana May 8 and 17, 1927 were obviously breeding. Three males and three females collected May 30 and June 2, 1912 on Volcán de San Salvador were likewise breeding, the females all showing marked incubation patches.

Plumage notes.— Since the juvenal wing and tail feathers are retained the first year, it stands to reason that the species does not reach maturity until the first annual (first postnuptial) molt at least. As in the case of *T. rufitorques* the wings and tails of one-year-old birds, particularly males, are shorter than in adults. Besides the shorter wings and tail there are other marks of immaturity usually present in the dried skin, such as the buff-spotted greater coverts, and still others, such as the colors of the soft parts, which disappear as soon as the skin is dried. As to the olive and brownish extremes of coloration it is clear that age and sex are not responsible, for the grayest and reddest individuals in the series of eleven both chance to be one-year-old males. There appears to be not the slightest average sex difference so far as color is concerned. The two fully adult males measure: wing, 127-132; tail, 100-104. Six one-year-old males measure: wing, 120-122; tail, 91-95. Three adult females are all slightly larger than the young males and measure: wing, 122-124; tail, 95-100.

Colors of soft parts.— Adult male: iris, dark brown; bill, light brown, olive at base of mandible; eyering, chrome yellow; tarsi and feet, brownish olive. One-year-old male: iris, dark brown; bill, olive, dusky at base; eyering, greenish yellow in one case, orange-yellow in another; tarsi and feet, dusky greenish olive. Females not recorded.

Turdus grayi umbrinus Griscom. GUATEMALA ROBIN.

Turdus grayi umbrinus Griscom, Am. Mus. Novit., 438, p. 5, December 15, 1930—Finca El Cipres, Mazatenango, Guatemala.

Specimen collected.—Puerto del Triunfo, 1 (January 15, 1926).

Status.—Uncertain, but probably a sporadic winter visitant.

Remarks.—The single specimen recorded above is so very different even from the brownest extremes of the resident *megas* and is so typical of *umbrinus* that we have little hesitation in considering it as a wanderer, probably from the Guatemalan highlands, and not an individual variant of *megas*. It was collected in the huiscoyol palm association in the heavy jungle near the town of Puerto del Triunfo.

Turdus grayi megas¹ Miller and Griscom. NICARAGUA ROBIN. SINSONTLE (all robins).

Turdus grayi megas Miller and Griscom, Amer. Mus. Novit., 183, p. 3, July 18, 1925—Matagalpa, Nicaragua; Miller, Condor, 34, p. 15, January, 1932—Sonsonate (nesting).

Turdus grayi (not of Bonaparte) Baird, Rev. Amer. Birds, 1, p. 26, 1872—part, Acajutla; Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 18, 1879—part, Acajutla.

Planesticus grayi grayi Ridgway, Bull. U. S. Nat. Mus., 50, pt. 4, p. 117, 1907—part, Salvador.

Turdus grayi grayi Hellmayr, Journ. fur Orn., 50, p. 50, 1902—part, Salvador; Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 375, 1934—part, El Salvador (crit.).

Specimens and records.—Lake Olomega, 3; Divisadero, 1; Mt. Cacaguatique, 2; San Salvador, 10; Sonsonate, 4; Volcán de Santa Ana, 2; San José del Sacare, 1; Hacienda Chilata, 1; Barra de Santiago, 1; Lake Guija, 1. Also noted at Lake Chanmico; Zapotitán; San Sebastián; Ciudad Barrios; Colima. Recorded from Acajutla; Sonsonate.

Status.—Common resident throughout the country from sea level to 7,200 feet. Occurs in all zones and associations except the denser portions of the Humid Upper Tropical Zone forests.

Remarks.—In general characters El Salvador specimens are very close to typical *megas*. They have been carefully compared with the type of that race and also with other Nicaragua material in the

¹ With Hellmayr's findings in mind, we have (1935) reopened the matter of the status of *megas*. We now believe it very dubious as a race and so slightly different from *grayi* that its systematic life is in the balance. We had not previously compared *megas* with *grayi*.

American Museum of Natural History and, while averaging very slightly more ochraceous than Nicaraguan examples, some of the El Salvador birds are identical with those from the former country. Although varying to some extent individually and seasonally (more ochraceous in fresh plumage, grayer when worn) there is no discernible geographic variation in this species within the limits of El Salvador. Specimens from the Guatemala border at Lake Guija and from very close to the border at Barra de Santiago are in no way distinguishable from those from the Oriente. It is therefore patent that the range of *megas* must extend for a short distance into western Guatemala and also that the area of intergradation between *megas* and *umbrinus* must be a very restricted one.

The Nicaragua robin presents a striking exception to the rule exemplified by the four other resident species of *Turdus*. The latter are all confined to narrow geographical or zonal limits on one or more mountain tops. The present form, on the other hand, is of widespread and general distribution. It ranges from sea level upward, over all types of associations, to the summits of the coastal mountains, and inland into the pines and oaks of the cordillera. The one locality where none was encountered was Los Esesmites, but even there its apparent absence is probably not actual, for it was noted as a fairly common bird at San José del Sacare. Probably the foothills of the Arid Lower Tropical Zone constitute the center of abundance, but on the coastal plain, particularly in the better-watered parts, there are numerous pairs everywhere. At Puerto del Triunfo they were common in the mangroves as well as in the coyol palm undergrowth in the deep forest. In May, 1927, there were several pairs at the very summit of Volcán de Santa Ana, where they occurred together with *Turdus rufitorques*. The elevation here (7,200 feet) is by far the highest at which the species was found, although several were noted up to 6,000 feet in more open sections of the cloud forest on Santa Ana and to 4,500 feet on Volcán de San Salvador.

Nesting.—In nesting as well as in other ways the Nicaragua robin is a perfectly typical representative of the American members of the genus. The nests are noteworthy as being replicas of those of *migratorius* even to the sublining of hardened mud. Generally speaking, they are placed low down near the ground, in one case as low as three feet. There is usually very little attempt at concealment. Eggs, two or, more usually, three in number, are laid from about April 15 to June 1. It is of interest to note that the eggs are similar

to a spotted, recessive type sometimes laid by *migratorius*.¹ The ground color is pale sage green or pale bluish green and is so thickly covered with small, usually longitudinal, irregular markings of bright rusty brown as sometimes nearly to obscure it. There is normally a coalescence of markings at the larger end, forming an almost solid cap in the most heavily marked eggs. A set of three fresh eggs collected at Chilata on April 26, 1927, measures 29.3×21.5 ; 28.8×21 , and 28.5×21.4 . Accompanying the slight progressive decrease in size is a corresponding decrease in spotting in the second egg and a very decided decrease in the third. This nest was found while under construction and was visited every day until the set was complete. The eggs were laid in the order listed and at the rate of one every second day.

Plumage notes.—The juvenal plumage is not so radically different from that of the adults as is usually the case with this group. In general it is decidedly more ochraceous, but the spotting on the underparts is relatively inconspicuous and dorsally is reduced to narrow, buffy shaft streaks. After the postjuvenal molt the young are not distinguishable from adults and thus, unlike *rufitorques* and *infuscatus* (in which the sexes differ), but like *rubicundus* and *differens* (in which the sexes are alike), they attain what is essentially the adult body plumage the first fall. The chief distinction between adults and postjuveniles is in the juvenal flight feathers, which are, of course, normally retained until the first postnuptial molt. One-year-old males have a wing length of approximately 125 mm., while fully mature males average about 135. The size differences due to age thus closely parallel the other local species. There is no spring (prenuptial) molt observable in any of the several specimens taken throughout the spring months.

Colors of soft parts.—Adults: not recorded. Juveniles: iris, dark brown; bill, light reddish brown; tarsi and feet, brownish horn-color.

***Turdus plebejus rafaelsensis* Miller and Griscom. BROWN MOUNTAIN ROBIN.**

Turdus plebejus rafaelsensis Miller and Griscom, Amer. Mus. Novit., 183, p. 4, July 18, 1925—San Rafael del Norte, Nicaragua.

Turdus ignobilis differens Hellmayr (not *Merula differens* Nelson), Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 391, 1934—part, El Salvador (crit.).

Specimens collected.—Los Esesmites, 14 (February 4 to March 5, 1927).

¹ Fisher, Bull. Nuttall Orn. Club, 3, p. 97, 1878.

Status.—Common inhabitant during February and March of the Humid Upper Tropical forests on Los Esesmls, where it breeds and presumably is a permanent resident. The vertical range is from 7,800 to 9,000 feet (fig. 21).

Remarks. The range of this robin in El Salvador is apparently confined to the cloud forest on Los Esesmls. Its discovery in typical form at this point shows the occupancy of a vastly greater territory than was suspected in 1925, when Miller and Griscom named it from the mountains of Nicaragua. The likelihood that this same race is the one which will be found on the intervening highlands of Honduras amounts to a certainty. Comparison of the Los Esesmls specimens with the type and several topotypes of *rafaelensis* fails to disclose any differences which are not purely individual in nature. The race is a fairly stable one over its entire known range. The fact that the El Salvador birds show no tendency to vary in the direction of *Turdus plebejus differens* (Nelson) of the high mountains of extreme southern Chiapas is not surprising. Los Esesmls, although about halfway between the type localities of *differens* and *rafaelensis* has, as shown by various other forms as well as the present one, much closer affinities with the mountains of north-central Nicaragua than with those of Guatemala and Chiapas.

Although Hellmayr (sup. cit.) states that in his opinion, *rafaelensis* is not distinguishable from *differens*, we have compared our local series not only with large series of *plebejus* from Costa Rica, but with the type and other specimens of *differens* in the national collections at Washington, and consider all three forms to be easily distinguishable. Hellmayr treats *plebejus* as a race of *ignobilis*, but we have no material by which personally to investigate the question.

Nesting.—In February and early March, 1927, mountain robins were very common in the more open parts of the cloud forest on Los Esesmls. It was noticeable that they were invariably in pairs and that the males were in full song. Dissection of specimens showed the breeding season was fast approaching. These males were all in breeding condition, but the females collected would not have laid until possibly the middle of March. A nest which was apparently nearly finished was noted in the tufts of moss and arboreal parasites growing on a small rotten branch some twenty feet above ground. As nearly as could be observed it was a bulky structure, evidently built chiefly of green moss. This nest was passed at various times between March 1 and 8, and both parents were usually close by.

Plumage notes. As with the foregoing species (*grayi*) there is, in the present case, no apparent difference in the body plumages, either between the sexes or between adults and postjuveniles. In this respect, then, *plebejus*, like *grayi*, belongs to the relatively small group of robins which attains the body plumage of maturity at the time of the postjuvénal molt and in which the sexes are alike in color. The wings and tails of first-year birds are, of course, shorter and show more abrasion, and usually there are a few of the spotted greater coverts held over until the spring at least. The wings of six one-year-old males average about 127 mm., while those of five adult males average 133 mm.

Colors of soft parts.—Sexes alike: iris, tarsi, and feet, dark brown; bill, blackish brown.

***Turdus infuscatus* (Lafresnaye). BLACK ROBIN. SINSONTLE NEGRO.**

Merula infuscata Lafresnaye, Rev. Zool., p. 41, 1844—Mexico.

Turdus infuscatus Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 414, 1934—El Salvador.

Specimens collected.—Los Esesmiles, 14 (February 6 to March 5, 1927); Volcán de Santa Ana, 3 (May 10, 17, 1927).

Status.—Fairly common resident in the Humid Upper Tropical Zone cloud forests on Los Esesmiles and Volcán de Santa Ana (fig. 21).

Remarks.—The series from Los Esesmiles is seemingly typical *infuscatus*. Birds from that locality agree very closely in size with the measurements recorded by Ridgway,¹ and direct comparison with specimens from the State of Vera Cruz brings to light no obvious color differences in the adult males. However, it is possible that adequate series of females and young males would demonstrate recognizable characters by which to distinguish birds from the extreme northern and southern sections of the range of the species. Unfortunately we have had no opportunity of comparing other than adult males and so must leave the final determination in abeyance.

On the other hand, the two young males from Volcán de Santa Ana are so much darker and more slaty (less reddish) brown than the two of similar age from Los Esesmiles that it is more than probable that they represent a distinct race. This we forbear to name, pending examination of young males and females of typical *infuscatus*.

Black robins were found to be rather common in the denser parts of the cloud forests. In early February on Los Esesmiles they were

¹ Bull. U. S. Nat. Mus., 50, pt. 4, p. 121, 1907.

invariably in flocks in which old, black males usually predominated. Keeping as they did to the upper foliage (the average height at which they were found was about fifty feet), they were unusually difficult to collect. Like many other local frugivorous species they had favorite feeding trees to which they came throughout the day to gorge on small berries, and the easiest method of securing specimens was to locate such a tree and to select from the visiting flocks (which varied in number from half a dozen to perhaps twenty birds) such specimens as were desired.

In the latter part of February and early March the flocks were rapidly breaking up into pairs, and males were singing everywhere after the first of March, whereas before that time they had been silent. The song is astonishingly similar, not only in tone and quality, but in variety also, to that of the mockingbird (*Mimus polyglottos*). It is therefore very different from that of the other local robins. Later in the year, in May on Volcán de Santa Ana, the flocks had entirely dispersed and only single males were found there. However, just as during the preceding February and March they kept high up in the treetops, and it was chiefly through the songs of the males that the species was detected.

Nesting.—Pairing begins about March 1. Males taken May 10 and 17 were obviously breeding at the time.

Plumage notes.—The one-year-old males of this species are similar to the females, and the black plumage is not acquired until the first annual (first postnuptial) molt at least. These young males differ from the females in being decidedly darker, duller, and more grayish (less ochraceous) in color; the throats are more heavily streaked, and occasionally some brownish black feathers are scattered through the interscapular and pectoral regions. At this age there is a very limited and irregular spring (first prenuptial) molt which affects in varying degree the body plumage and even sometimes one or two tertials. The feathers acquired at this time vary greatly in color, but as a rule are darker and contrast more or less with the older plumage. Males, at least, breed at this age. One-year-old and adult females are much alike to judge from the single example of each age collected. Young of both sexes have the middle and greater wing coverts marked apically with wedge-shaped spots of buff or cinnamon. These are retained, at least in part, through the first year although some may be lost in the spring molt. Occasional black males have, here and there, a few brown-mottled feathers, but whether this is the second-year stage or is purely individual in character is not known.

The differences in size due to age and sex as indicated in the present series are shown below.

	Wing	Tail
11 adult males	121-130(127)	89-102(97)
4 one-year-old males	114-122(117)	80- 91(88)
1 adult female	124	95
1 one-year-old female	116	88

Colors of soft parts.—Adult males: bill, tarsi, feet, and eyering, orange-yellow; iris, dark brown. Adult female: bill and iris, dark brown; tarsi and feet, dusky orange. One-year-old of both sexes: similar to adult female, but bill of young female darker; bills of young males mottled with varying amounts of yellow; but by the following spring the bill is mostly yellow, as is the eyering.

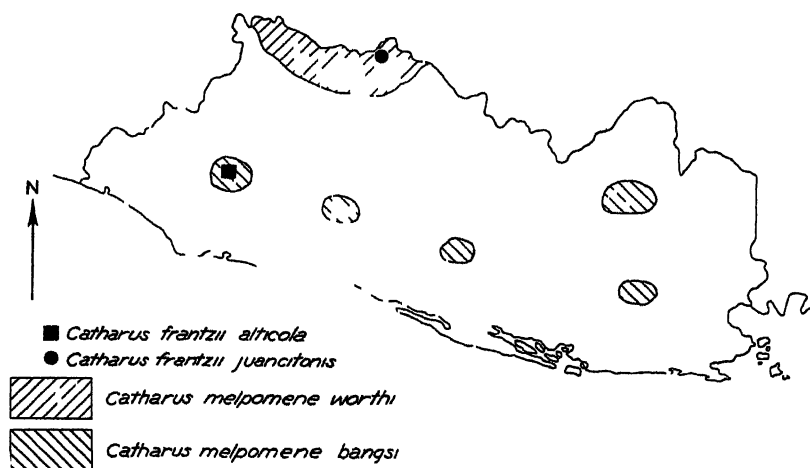


FIG 22. Distribution of four subspecies of nightingale-thrushes of the genus *Catharus* in El Salvador.

Catharus occidentalis juancitonis Stone. INTERMEDIATE NIGHTINGALE-THRUSH.

Catharus frantzi juancitonis Stone, Proc. Acad. Nat. Sci. Phila., 83, p. 2, January 23, 1931 San Juancito (Dept. Tegucigalpa) Honduras.

Catharus occidentalis altirola Hellmayr (not *Catharus alticola* Salvin and Godman), Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 469, 1934—El Salvador (crit.).

Specimens collected.—Los Esesmiles, 3 (February 4 to 24, 1927).

Status.—Uncommon in midwinter, and probably resident, in the Humid Upper Tropical Zone on Los Esesmiles. The vertical range is from 7,000 to 9,000 feet (fig. 22).

Remarks.—Los Esesmiles specimens of this thrush are varyingly intermediate between *C. f. frantzi* and *C. f. alticola*. One bird is

indistinguishable from *alticola* except for the under tail coverts, which are grayish white as in *frantzii*, the other two are almost exactly intermediate in all respects, though perhaps closer to *alticola*. The validity of this race has recently been questioned by Hellmayr.

These large nightingale-thrushes were confined to the cloud forest, and none was ever seen or heard in any other association. Although one or more males were heard singing whenever hunting was carried on in the zone to which the species is restricted, only a few were actually seen. The three specimens which were collected represent at least an hour each of laborious crawling about on hands and knees in the dense undergrowth at the borders of clearings and along trails. The singing males were extremely shy and were likely to keep silent as long as anyone remained in the vicinity, but occasionally one would respond to the well-known ruse of squeaking in imitation of a wounded bird. The song is remarkably sweet and clear and, though strongly suggestive of that of the hermit thrush, is very much weaker. It also carries a deceptive quality of distance. One male for which search was made for some time in an area of ten-foot-high, tangled, second growth and matted vines finally resumed singing, as was thought, from a new location a hundred yards away, but was suddenly discovered to be in plain sight only some twenty feet distant.

Nesting.—On February 28 a partially built nest of this thrush was found on a horizontal, moss-covered branch which projected out over a stream in a little ravine. The branch on which the nest was placed was about ten feet above the stream bed and was so covered with moss and parasitic growth that the nest would have been completely overlooked had not one of the birds been seen to fly to it carrying a beakful of moss. On a visit to the site a few days later, the nest-tree was found to have been thrown down by a hard gale following a week of rainy weather, and no trace of nest or birds could be found. This was probably a very early pair, for the three males which were collected, one of them as late as February 24, showed only the beginnings of sexual activity.

Colors of soft parts.—Adult males: iris, dark brown; maxilla, black; mandible, dull orange; tarsi, dusky orange-brown; feet darker; edge of gape and mouth lining, bright orange.

***Catharus occidentalis alticola* Salvin and Godman. SALVIN'S
NIGHTINGALE-THRUSH.**

Catharus alticola Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 33, September, 1879—Volcán de Fuego, Guatemala.

Catharus occidentalis alticola Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 469, 1934—El Salvador.

Specimens collected.—Volcán de Santa Ana, 6 (May 10 to 17, 1927).

Status.—Fairly common breeder and probably a permanent resident in the Humid Upper Tropical Zone on Volcán de Santa Ana (fig. 22).

Remarks.—The six specimens, all of them males, appear to be typical of this dark-colored, Pacific coast race.

Perhaps because of the activity incident to the full swing of breeding activity, *alticola* was found to be more common on Volcán de Santa Ana (pl. XXII) than was *juancitonis* on Los Esesmites. Males were heard singing everywhere in the cloud forest at from 6,000 to 7,000 feet, and no particular difficulty was experienced in collecting six specimens. Females, though, proved to be elusive, and we never succeeded in taking one or in finding a nest, in spite of careful search about several spots where breeding males were collected.

***Catharus aurantiirostris worthi* Stone. HONDURAS NIGHTINGALE-THRUSH.**

Catharus melpomene worthi Stone, Proc. Acad. Nat. Sci. Phila., 83, p. 2, January 23, 1931—San Juancito (Dept. Tegucigalpa) Honduras.

Catharus aurantiirostris bangsi Hellmayr (not *Catharus melpomene bangsi* Dickey and van Rossem), Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 471, 1934—part, El Salvador.

Specimens collected.—Los Esesmites, 6 (February 16 to March 4, 1927).

Status.—Present in February and early March, and presumably resident, in the oak-pine association of the Arid Upper Tropical Zone on Los Esesmites. The vertical range is from 6,400 to 8,000 feet (fig. 22).

Remarks.—We are at present undecided as to the systematic status of *worthi* since, in geographical range and in characters, the form lies between *C. a. bangsi* of coastal and east-interior El Salvador and *C. a. albidior* of the northwestern Nicaraguan highlands. From present evidence *worthi* appears to have slight, though definite, characters developed fairly uniformly over a considerable range. Hellmayr (sup. cit.) considers *worthi* synonymous with *bangsi*, and *albidior* synonymous with *costaricensis*.

The Honduras nightingale-thrush enters El Salvador only along the spurs of the Honduran cordillera in the extreme northern interior.

On Los Esesmiles it was not uncommon in brush tangles, blackberry thickets, fern bracken beneath the pines, and in patches of scrub oaks, usually near some little brook or spring. At this time of the year most of them were solitary, but males sang not infrequently, and by the first of March a pair began to be seen here and there. On no occasion were these thrushes found in the cloud forest.

Catharus¹ aurantiirostris bangsi Dickey and van Rossem.
PACIFIC NIGHTINGALE-THRUSH.

Catharus melpomene bangsi Dickey and van Rossem, Proc. Biol. Soc. Wash., 38, p. 135, November 13, 1925—Volcán de San Salvador, El Salvador; Stone, Proc. Acad. Nat. Sci. Phila., 83, p. 2, January 23, 1931—Volcán de San Miguel (crit.); Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 311, 1932—Salvador (crit.).

Catharus aurantiirostris bangsi Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 471, 1934—El Salvador (crit.).

Specimens collected.—Volcán de San Salvador, 3 (April 22, June 3, 1912); Volcán de San Miguel, 1 (March 22, 1926); Mt. Cacaguatique, 3 (December 14, 15, 1925); Volcán de Santa Ana, 2 (May 6, 12, 1927).

Status.—Fairly common resident of the Arid Upper Tropical Zone on the higher mountains of the coastal range and in the interior on Mt. Cacaguatique. The vertical range is from 3,000 to 6,500 feet (fig. 22).

Remarks.—This Pacific coast race of the nightingale-thrush is distinguished from the other northerly forms of *Catharus aurantiirostris* by its dark ventral coloration combined with strongly rufescent upperparts. Three midwinter specimens from Mt. Cacaguatique are apparently exactly like coastal examples, a notable fact considering that on Los Esesmiles there occurs another subspecies, *C. a. worthi*.

The range of *bangsi* centers in the undergrowth of the oak forests of the Arid Upper Tropical zone, but stragglers were occasionally found a short distance down in the Arid Lower Tropical woods on Mt. Cacaguatique and Volcán de San Miguel and also at the edge of the cloud forest on San Salvador and Santa Ana. Such occurrences, though, are infrequent, and probably no individuals are permanently resident in such associations.

The song of this species is very fine and clear and is typically thrushlike. It reminds one instantly of *Hylocichla* of the northern

¹ Considering the characters shown by some species of *Catharus* (*dryas* for example) we do not believe that generic separation of *Hylocichla* and *Catharus* can be maintained.

woods. The ordinary call-note is a metallic, nasal twang, very similar to that sometimes given by *Hylocichla guttata*, which the bird in general habits and behavior closely resembles. A most noticeable and frequently betraying character is the manner in which the feet, bill, and eyering stand out against the background of this thrush's normal habitat. The plumage blends so perfectly with the ground litter where most of this bird's time is spent that, were it not for the bill and feet, it would be practically invisible in the half-light of the undergrowth. More than once the movements of the brightly colored bill and feet attracted our attention when otherwise the bird would have been overlooked completely. One wonders of what possible benefit such markings can be, especially when they nullify to a great extent the protective, neutral color of the plumage; and why, if the protective plumage is the result of natural selection, the same influences have not been effective in eliminating the conspicuous color of the soft parts.

Nesting.—A nest under construction was found at 6,000 feet altitude on Volcán de Santa Ana May 17, 1927. It was only three feet from the ground in the crotch of a nearly leafless oak sapling which grew in a grove at the juncture of Humid and Arid Upper Tropical Zones on the east slope of the mountain. A well-traveled trail passed within a few feet of this nest, which was in plain sight from all sides. The body of the nest was of bright green moss from the closely adjacent cloud forest, and the lining was of fine, hard, yellow grass stems. Both parents were carrying lining when the nest was discovered.

Colors of soft parts.—Adults: iris, dark brown; eyering and bill, bright coral-red, and with the culmen of the bill blackish brown on the ridge; tarsi, feet, and claws, orange or orange flesh-color. First winter: similar, but bill more extensively dusky and with only the maxillary tomia and base of mandible coral-red; tarsi and feet, darker and more brownish orange.

***Hylocichla mustelina* (Gmelin). WOOD-THRUSH.**

Turdus mustelinus Gmelin, Syst. Nat., 1, pt. 2, p. 817, 1789—New York.

Specimen collected.—Mt. Cacaguatique, 1 (December 8, 1925).

Status.—Rare midwinter visitant to the oak association of the Arid Upper Tropical Zone.

Remarks.—This specimen, a male of the year, was shot at 3,500 feet altitude, in the underbrush near a mountain stream flowing

through the oaks. No others were seen anywhere in the country, and it is pretty safe to say that the wood thrush is a very rare bird in El Salvador.

***Hylocichla ustulata ustulata* (Nuttall). RUSSET-BACKED THRUSH.**

Turdus cestulatus [= *ustulatus*] Nuttall, Man. Orn. U. S. and Canada, Land Birds, ed. 2, p. 400 and errata, p. vi, 1840—Fort Vancouver, Washington.

Specimens and records.—Divisadero, 1 (October 14, 1925); Mt. Cacaguateque, 6 (November 27 to December 21, 1925); Puerto del Triunfo, 1 (January 17, 1926); Volcán de Conchagua, 1 (February 28, 1926); San Salvador, 1 (March 15, 1912). Also noted at Colima (January 21, 1927).

Status.—Common winter visitant throughout the higher parts of the Arid Lower Tropical Zone and in lesser numbers in the lowlands. Extreme dates of arrival and departure are October 14 and March 15.

Remarks.—The russet-backed thrush differs radically from the two olive-backs in that it appears as a common winter visitant, while the olive-backs are, in the main, migrants. The distribution of the present race is apparently general over the whole of the hill country lying within the Arid Lower Tropical Zone. In the lower country it is decidedly rare, for only two or three birds were noted in the coyol-palm growth at Puerto del Triunfo in January, 1927. It is in the multitude of berry- and fruit-bearing shade trees growing above the coffee that the russet-backs are commonest. On Mt. Cacaguateque in November and December, 1925, they literally swarmed in suitable localities; some trees had constantly arriving and departing streams of these birds, with perhaps twenty-five or more in a tree at once.

***Hylocichla ustulata swainsoni* (Tschudi). EASTERN OLIVE-BACKED THRUSH.**

Turdus Swainsoni "Cab. MSS." Tschudi, Fauna Peruana, Aves, p. 28, 1845—Carleton House [Saskatchewan River], lat. 53°, Canada.

Specimens and records.—Los Esesmites, 1 (February 25, 1927); Lake Ilopango, 1 (April 13, 1912). Also noted at Volcán de Santa Ana (May 7 and 16, 1927).

Status.—Rare midwinter visitant to the Humid Upper Tropical Zone on Los Esesmites and a spring migrant of varying abundance through both the Arid Lower Tropical and Humid Upper Tropical Zones.

Remarks.—The eastern olive-backed thrush was detected only once as a midwinter visitant. It is probable that the spring specimen taken April 13 at Lake Ilopango, had also spent the winter in that locality, for the migration flights of this form do not appear until early May. On May 7 and May 16, 1927, there were very marked flights passing through the cloud forest on Volcán de Santa Ana. Several specimens of *swainsoni* were shot, but in the press of other work not preserved, on each of these days. However, as there were at hand several specimens of *almae* for direct comparison, there is no doubt as to the identity.

***Hylocichla ustulata almae* Oberholser. WESTERN OLIVE-BACKED THRUSH.**

Hylocichla ustulata almae Oberholser, Auk, 15, p. 304, October, 1898—East Humboldt Mountains, Nevada.

Specimens collected.—Chilata, 2 (April 23, 1927); Volcán de Santa Ana, 2 (May 7, 16, 1927).

Status.—Locally common spring migrant through the mountains. Occurs in both Arid Lower and Humid Upper Tropical Zones.

Remarks.—As pointed out by the original describer, the Great Basin form of the olive-backed thrush is the grayest (least brownish) of the races of *Hylocichla ustulata*. It is an easily definable form and should be accorded the recognition it deserves.

Its known status in El Salvador is that of a spring migrant. At Chilata on April 23, 1927, a small wave of thrushes passed through, and the only two which were collected were *almae*. No more were seen until May 7 and May 16 of that year when, on Volcán de Santa Ana, olive-backed thrushes were noted commonly in the cloud forest at from 4,500 to 6,000 feet. By far the majority were of the eastern race for, on each of these days, several specimens of *swainsoni* were collected, but in each case only one of *almae*.

***Sialia sialis meridionalis* Dickey and van Rossem. EL SALVADOR BLUEBIRD.**

Sialia sialis meridionalis Dickey and van Rossem, Condor, 32, p. 69, January, 1930—Los Esesmites, Chalatenango, El Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 813, 1932—in text, Salvador (crit.); Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 480, 1934—El Salvador.

Specimens and records.—Mt. Cacaguatique, 2 (November 27, 1925); Los Esesmites, 15 (February 3 to March 8, 1927); San José del Sacare, 1 (March 15, 1927). Also noted near La Reina (January 29, 1927); La Palma (January 29, 1927).

Status.—Common resident of the oak-pine association in the Arid Upper Tropical Zone along the cordillera. The vertical range is from 2,500 to 8,500 feet.

Remarks. This extreme southern race of *Sialia sialis* resembles the common bluebird of the eastern United States but in series it averages smaller. The dorsal coloration is almost exactly the shade of *sialis* in the males, while the females are much more extensively blue above than the females of *sialis* and in color are a little brighter. The brown of the underparts of both sexes is decidedly paler and is about halfway between *sialis* and *guatemalae*. Whether *meridionalis* intergrades with the larger *guatemalae* is not known at this time. There is little doubt that *meridionalis* ranges over the highlands of at least the southern portion of Honduras, for several bluebirds were collected within a few hundred feet of the El Salvador Honduras boundary, and others were actually seen on the Honduras side of the Sempul River.

In El Salvador the bluebird is confined principally to the oaks and pines along the south (Pacific) slope of the cordillera. Since the destruction of large areas of cloud forest along the north sides of the higher ridges, the species has spread over sections where it previously could scarcely have existed. In the clearing process many large stumps have been left standing in what are now grassy pastures or cornfields. These, of course, are soon utilized by several species of woodpeckers and, following them, by the bluebirds. The normal habitat, however, is in the oaks and pines, and in that association the species is not uncommon, although there is a tendency for the distribution to be local. For instance, on Mt. Cacaguatique, a small flock of bluebirds was seen several times along one particular oak ridge, but none was ever seen on any other part of that mountain. Again, when traveling between La Reina and Los Esesmiles, they were noted commonly near La Reina, San José del Sacare, and La Palma, but not a single individual was observed between La Palma and Los Esesmiles. At the last-named point they were again fairly numerous.

Although small flocks seem to be the order during the early winter months, pairing starts as early as February 1, and from then on each pair is always to be found at or near the same spot. The appearance, call-notes, and habits of this southern race are seemingly identical with those of the familiar northern one.

Nesting.—As early as the middle of February on Los Esesmiles, birds were seen carrying nesting material into holes, usually high up,

in the old dead snags about clearings. Laying, to judge from the condition of specimens taken, starts about March 1. A female collected at San José del Sacare on March 15 had obviously been incubating for some time.

Colors of soft parts. Not recorded.

Myadestes unicolor veraepacis Griscom. GUATEMALA SOLITAIRE.
GUARDA BARRANCA.

Myadestes unicolor veraepacis Griscom, Amer. Mus. Novit., 438, p. 6, Dec. 15, 1930—Finca Sepacuite, 50 mi. east of Cobán, Alta Vera Paz, Guatemala.

Specimens collected.— Los Esesmiles, 5 (February 10 to March 5, 1927).

Status. Present in February and March, and undoubtedly resident, in the cloud forest on Los Esesmiles. The vertical range is 7,800 to 9,000 feet.

Remarks. Measurements of the four males are as follows: wing, 96 101; tail, 87 95. The single female measures: wing, 91; tail, 83. Four of the five specimens are very similar to typical *veraepacis* in coloration, while the fifth is exactly intermediate in all respects between *veraepacis* and the Nicaraguan race, *pal lens*.

This solitaire proved to be quite rare in the one locality where it was found. It was apparently confined to the deep woods and never was seen to come out into the open clearings like the next species. Two of the five specimens were taken as they came to berry-bearing trees in the forest; the others were encountered singly in thin foliage near the ground, but always in the heaviest and most darkly shaded ravines. Solitaires were frequently heard singing, and the songs were in no way inferior to that of the well-known *Myadestes townsendii*. It was never possible, though, to determine the specific identity of individual singers.

Nesting. On March 5, 1927, a male solitaire was shot under circumstances that indicated a nearby nest. He flew back and forth across one section of very steep hillside, sometimes disappearing entirely, but invariably returning to the same spot. An extended search failed to reveal any nest and he was finally collected. Two days later the nest, nearly ready for eggs, was discovered purely by accident at the very spot which had been carefully combed previously. This nest was tucked into a shallow crevice near the top of a four-foot, slightly overhanging bank of earth (the result of the fall of a great tree) and was completely hidden by the fronds of overhanging

ferns. It was compactly built of green moss, exactly matching the mossy bank into which it was set and was lined with fine rootlets. At no time was the female seen.

Colors of soft parts. Adults: iris, dark brown; bill, brownish black; tarsi and feet, light brown.

Myadestes obscurus oberholseri Dickey and van Rossem.

SOUTHERN BROWN-BACKED SOLITAIRE. GUARDA BARRANCA.

Myadestes obscurus oberholseri Dickey and van Rossem, Proc. Biol. Soc. Wash., 38, p. 133, November 13, 1925—Volcán de San Rafael, Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 303, 1932—Salvador (crit.); Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 435, 1934—El Salvador (crit.).

Specimens collected.—Los Esesmiles, 6 (February 12 to 25, 1927); Volcán de San Salvador, 2 (May 30, 1912); Volcán de Santa Ana, 8 (May 6 to 20, 1927).

Status.—Fairly common resident of the Humid Upper Tropical Zone on the volcanoes of Santa Ana and San Salvador and on Los Esesmiles. The vertical range is above 4,500 feet on the coast range and above 7,500 feet along the cordillera.

Remarks.—Specimens collected subsequently to the two examples on which the original description was based do not materially change the diagnosis of this southern form of *Myadestes obscurus*. It is the smallest of the known races. The underparts, as compared with *obscurus* and *occidentalis*, are slightly darker and decidedly purer gray, and the back is more strongly suffused with grayish. Nine fully adult males of *oberholseri* measure: wing, 97–100 (98.5); tail, 92–100 (97.6). Late winter specimens from Los Esesmiles are found to be identical with breeding birds from the coast range when due allowance for wear is made.

This solitary, in El Salvador, is strictly a Humid Upper Tropical Zone species and is confined to the cloud forests or to clearings in them. It was noticeable, however, that the brown-backed solitaires were decidedly more common in the lighter, more open forest, while the opposite was true of *veraepacis*, which by choice sought the most densely shaded ravines and dense woods. There is no set rule, however, and it was sometimes possible to find both species in the same tree. Just as our common solitary (*M. townsendi*) of the north, during the winter, often consorts with flocks of bluebirds, so does the brown-backed species in El Salvador. On Los Esesmiles there were several clearings, some of them many acres in extent, where the

only traces of the original forest were charred tree stumps, dotted more or less closely over close-cropped grass pastures. Such places were the favorite resorts of the local bluebirds and, as a rule, one or two brown-backed solitaires would be present also. During the breeding season on Volcán de San Salvador and Volcán de Santa Ana none was seen other than in the forest, most frequently along roads or trails because of the ideal nesting sites provided by the cuts.

Nesting.—Two nests were found in identical situations on Volcán de Santa Ana. Both were in shallow niches in the mossy, fern-grown, vertical banks of the winding hill road, or more properly trail, leading up the northeast flank of the mountain. The first nest, found at 6,800 feet May 8, 1927, was placed five feet above the road and two feet from the top of the bank and was completely hidden by a small, overhanging fern. In this case the only material used was gray grass with a lining of finer grass and a few feathers. The two eggs were on the point of hatching. On May 17 another nest—this time at an elevation of 6,000 feet—was discovered, like the first, by the accidental flushing of the sitting bird. Although the site was similar to that of the first nest, the construction was somewhat different in that the body of the nest was of bright green moss. The lining, though, was of fine grass as before. In this case also there were but two eggs (evidently the usual number) in which incubation was about one-third advanced. They measure 24.8×18.3 and 23×18.2 . The ground color is greenish white. The markings are in the shape of small irregular spots of bright reddish brown, sparingly distributed over most of the surface, but coalesced into a thick mass about the larger end.

Plumage notes.—The present species, like all thrushes with which we are acquainted, retains the juvenal remiges, rectrices, and usually some of the buff-tipped greater coverts through the first year. No spring molt is evident either in adult or one-year-old birds.

Color of soft parts.—Adult and one-year-old, sexes alike: iris, dark brown; bill, black; tarsi and feet, reddish brown.

Family SYLVIIDAE. Warblers, Gnatcatchers, and Kinglets

***Polioptila bilineata bairdi* Ridgway. BAIRD'S GNATCATCHER.**

Polioptila bairdi Ridgway, Proc. Biol. Soc. Wash., 16, p. 110, September 30, 1903—San Juan del Sur, Nicaragua.

Polioptila bilineata bairdi van Rossem, Auk, 48, p. 35, January, 1931—El Salvador (crit.).

Poliophtila plumbea bairdi Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 7, p. 505, 1934—El Salvador (crit.).

Poliophtila albiloris Baird (not of Selater and Salvin), Rev. Amer. Birds, 1, p. 70, 1872 part, La Unión; Sharpe, Cat. Birds Brit. Mus., 10, p. 454, 1885—part, La Unión; Ridgway, Man. N. A. Birds, p. 569, 1887 part, Salvador?.

Poliophtila bilineata albiloris Griscom, Amer. Mus. Novit., 414, p. 5, March 24, 1930—part, Salvador (crit.).

Poliophtila bilineata Salvin and Godman (not *Culicivora bilineata* Bonaparte), Biol. Centr.-Am., Aves, 1, p. 53, 1879—part, La Unión.

Poliophtila nigriceps Salvin and Godman (not of Baird), Biol. Centr.-Am., Aves, 1, p. 52, 1789—part, La Unión; Brewster, Bull. Nutt. Orn. Club, 6, p. 105, April, 1881—part, La Unión (crit.); Sharpe, Cat. Birds Brit. Mus., 10, p. 447, 1885—part, La Unión; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 3, p. 730, 1904—part, La Unión.

Poliophtila nigriceps nigriceps Hellmayr, Novit. Zool., 8, p. 358, 1901—part, "San Salvador."

Poliophtila superciliaris superciliaris Ridgway (not of Lawrence), Bull. U. S. Nat. Mus., 50, pt. 3, p. 727, 1904—part, La Unión.

Specimens and records.—Lake Olomega, 9; Rio San Miguel, 6; Volcán de Conchagua, 2; Rio Goascorán, 3; Divisadero, 11; Volcán de San Miguel, 1; Puerto del Triunfo, 1; San José del Sacare, 1; Zapotitán, 5; Barra de Santiago, 2; Lake Guija, 4. Also noted at Colima. Recorded from La Unión.

Status.—Common and generally distributed resident of brushy areas throughout the Arid Lower Tropical Zone. The species is very much more numerous east of the Lempa River than in the western departments.

Remarks.—The Central American black-headed gnatcatchers are now known to be geographic races of *Poliophtila bilineata*. Hellmayr (sup. cit., 1934) considers them to be conspecific with *plumbea*, an opinion in which he is probably correct, but which we do not follow until more is known about the seasonal plumage changes of *plumbea*. The present race, *bairdi*, ranges on the Pacific coast from northwestern Costa Rica to San Blas in western Mexico. It differs from *Poliophtila bilineata albiloris* of the Atlantic drainage of northern Central America and Chiapas in the shorter tail, in the dusky streak which in the females and males in winter plumage crosses the white lores from the anterior corner of the eye to the bill, and in the solidly black lores in the summer plumage of the males. For a more detailed discussion of characters and relationships of this and other forms the reader is referred to the above-cited papers of Griscom and van Rossem, where radically differing opinions are expressed.

In its local distribution Baird's gnatcatcher is a common inhabitant of brushy second growth and mimosa thickets everywhere in the lowlands of the Oriente and, though in decidedly lesser numbers, in the central and western portions of the republic. As in the cases of other species which prefer low, scrubby growth the area occupied by the present one has undoubtedly been materially increased by the destruction of forest. Gnatcatchers were never encountered in the deep woods, but they were usually present in the bushes which bordered clearings and in the low growth along streams in heavily timbered areas.

The rapidity with which family groups break up into pairs is truly astonishing. Even before the juvenal plumage is completely lost, the young of the year are to be found in couples, always male and female together, and thereafter throughout the year pairs are the absolute rule. A similar instance of juvenile pairing has already been noted in the case of *Synallaxis erythrorhoxa pacifica*.

Nesting. The dissection of specimens shows that breeding commences about April 1 and ends about July 1. A family party of a pair of adults and three half-grown young was noted at Zapotitán on June 10, 1912.

Plumage notes. The sexes are alike in the juvenal plumage. This stage closely resembles the later plumage of the females, but the colors are less pure and there is frequently a creamy tint on the underparts.

The postjuvenal (first winter) plumage is attained through a complete body and tail molt, and the young birds are then practically indistinguishable from winter adults of the same sex. By midwinter the skulls of the young birds have become fully granulated, and the last vestiges of dissimilarity between old and young have disappeared. The first prenuptial and adult nuptial molts commence in late January or early February and are completed between about March 1 and April 1. At this time the lores and upper eyelids become solidly black in the males, and many new feathers appear on the foreparts of the body generally. Although the females go through the same molt sequences as males, there is no change in the color pattern, and throughout the year they wear the grayish white lores and dusky preocular streak.

The postnuptial moult varies tremendously in the time of its inception and may start any time between the end of July and the latter part of September. At this time the males again assume the

white upper eyelids, white lores, and dusky preocular streak characteristic of the winter plumage.

Both sexes show a moderate amount of individual variation in the prominence of the dusky preocular streak which bisects the white of the loreal region. The pale extreme approaches the immaculate condition which is usual in *albifloris*, while the darkest specimens have a relatively broad mark which occupies most of the loreal space. As this variation is common to adults and first-winter birds alike, it would seem that the variation is normal to the race and is not due to age. Another feature—a comparatively rare one which is more likely to be seen in females than in males—is a short, white, post-ocular streak extending backward from the upper posterior edge of the eye. This sporadically appearing mark is very inconspicuous compared with the corresponding ones in *bilineata*, but is, nevertheless, indicative of the common origin.

Colors of soft parts.—Adults and young alike: iris, dark brown; bill, black with basal half of mandible plumbeous blue; tarsi and feet, plumbeous.

Stomach contents.—Tiny insects exclusively, 8.

Ramphocaenus rufiventris rufiventris (Bonaparte). NORTHERN LONG-BILLED ANT-WREN.

Scelopacinus rufiventris Bonaparte, Proc. Zool. Soc. Lond., 5, p. 119, 1837 (1838)—Guatemala.

Ramphocaenus rufiventris Salvin and Godman, Biol. Centr.-Am., Aves, 2, p. 219, 1892 - La Libertad; Volcán de San Miguel.

Ramphocacnus rufiventris rufiventris Ridgway, Bull. U. S. Nat. Mus., 50, pt. 5, p. 85, 1911- (cit. of above).

Specimens and records. San Salvador, 3 (April 4, 9, 18, 1912); Sonsonate, 1 (July 18, 1925); Divisadero, 1 (September 23, 1925). Recorded from La Libertad (February); Volcán de San Miguel (March).

Status.—Rare resident in the Arid Lower Tropical Zone. Recorded definitely from sea level to at least 2,300 feet.

Remarks.—The few specimens of northern long-billed ant-wren which were taken were shot more or less by accident as they were hopping or creeping, wrenlike, through thick underbrush. The species seems to be distributed sparingly but generally throughout the Arid Lower Tropical Zone, for it was collected personally at 800 and 2,300 feet. Alden Miller took one at 1,500 feet, and Salvin and

Godman record it from sea level and from Volcán de San Miguel, although at what altitude at the latter place is not known.

We follow Miller, Chapman, and Peters in transferring *Ramphocaenus* to the *Sylviidae*.

Nesting. A male taken by Alden Miller at Sonsonate on July 18, 1925, is marked "breeding."

Plumage notes. A young male taken at Divisadero September 23, 1925 has about half finished the postjuvenal body molt, but still retains the juvenal remiges and rectrices.

Colors of soft parts. Juvenal male: iris, grayish brown; bill, pale plumbeous; base of mandible, flesh color; tarsi and feet, delft blue.

Family BOMBYCILLIDAE. Waxwings

Bombycilla cedrorum Vieillot. CEDAR WAXWING.

Bombycilla cedrorum Vieillot, Ois. Amér. 1, p. 88, pl. 57, Sept. 1807 (1808)—Eastern North America.

Specimens and records. Rio San Miguel, 1 (February 12, 1926); San Salvador, 1 (March 15, 1912). Also noted on Volcán de Conchagua (February 25 and March 2, 1926).

Status. Fairly common, but erratic and local, winter visitant in the Arid Lower Tropical and Arid Upper Tropical Zones. In spring remains as late as March 15.

Remarks. Cedar waxwings were as erratic in their appearances in El Salvador as they are in the more northern parts of their winter range. The San Salvador specimen was taken from a flock of about one hundred birds which spent only one day in the vicinity. Two other flocks of about twenty each were seen the same day. The Rio San Miguel bird was likewise taken from a small flock which was seen but once. The nearest approach to permanence of location was on Volcán de Conchagua, where a flock of about a dozen birds made the pine woods on the summit their headquarters, and from there ranged well down into the tropical woods and coffee shade in search of berry-bearing trees.

Family CYCLARHIDAE. Pepper-Shrikes

Cyclarhis flaviventris flaviventris Lafresnaye. MEXICAN PEPPER-SHRIKE.

Cycl[aris] flaviventris Lafresnaye, Rev. Zool., p. 133, 1842—"Santa Cruz" (= Vera Cruz?), Mexico.

Cyclarhis flaviventris mesoleucus Dickey and van Rossem, Proc. Biol. Soc. Wash., 38, p. 135, November 13, 1925—San Salvador.

Specimens collected. Volcán de Santa Ana, 3; Chilata, 4; San José del Sacare, 1; San Salvador, 3; Volcán de San Salvador, 1.

Status. Fairly common resident of the Arid Lower Tropical Zone in the western departments, east to about 89° west longitude, where intergrading with *nicaraguae*. Vertical range 2,000 to 5,000 feet (fig. 23).

Remarks.—When the writers described *mesoleucus* they were unaware of the prior description of *nicaraguae*, and as there is no point in recognizing more than one connecting link in the gradual transition between *flaviventris* and *subflavescens*, the name *mesoleucus* has no standing other than as a synonym. Specimens from extreme western El Salvador are *flaviventris*, while those from the Oriente are *nicaraguae*. Those from the central districts are intermediates which would require a far larger series than is available to place with any degree of certainty. For the present we consider the single specimen from San José del Sacare, three from San Salvador (the type locality of *mesoleucus*), and one from Volcán de San Salvador, as closer to *flaviventris*. One bird from Miraflores seems to be *nicaraguae*.

The habitat of this pepper-shrike is principally the thin second growth of the foothills, although at times it may find its way into heavy forest. It is typically vireo-like in habits and song. Locally, as on the volcanoes of Santa Ana and San Salvador, pepper-shrikes, because of extensive clearing, have worked their way upward to the lower edge of the cloud forest.

Nesting.—Specimens taken at Chilata during the latter part of April, 1927, were all in breeding condition. A female collected on April 30 was ready to lay.

Colors of soft parts.—See next form.

Cyclarhis flaviventris nicaraguae Miller and Griscom. NICA-
RAGUA PEPPER-SHRIKE.

Cyclarhis flaviventris nicaraguae Miller and Griscom, Amer. Mus. Novit., 183, p. 6, July 18, 1925—Matagalpa, Nicaragua; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 321, 1932—Salvador.

Specimens collected.—Lake Olomega, 7; Puerto del Triunfo, 3; Divisadero, 1; Volcán de San Miguel, 4; Mt. Cacaguatique, 1; Miraflores, 1.

Status.—Fairly common resident of wooded areas in the Oriente, west on the coastal plain to about 89° west longitude. The vertical

range is from sea level to 3,500 feet and is wholly within the Arid Lower Tropical Zone (fig. 23).

Remarks. This race, the link connecting *flaviventris* with *subflavescens*, extends into the lowlands and foothills of eastern El Salvador. Its western limit in typical form apparently is Miraflores on the coast, and probably the north and south course of the Lempa River in the interior.

The type of cover occupied varies greatly, and the species is very adaptive in this respect, though rather thin, open woodland is per-

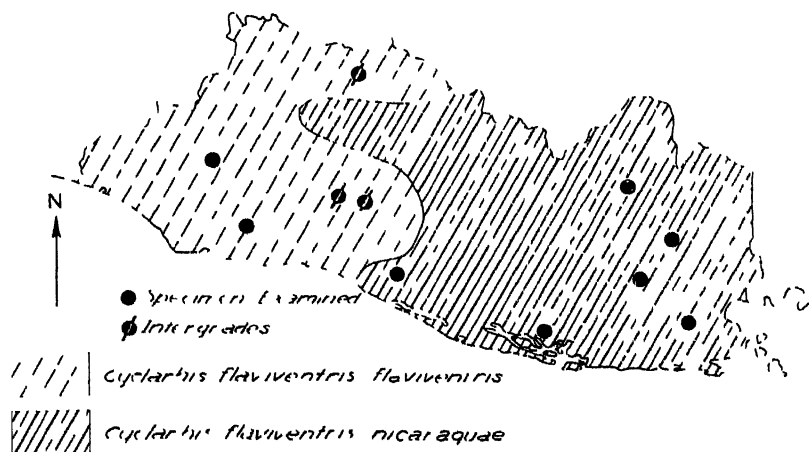


FIG. 23 Distribution of two races of pepper-shrike, *Cyclarhis flaviventris*, in El Salvador.

haps most favored. However, at Puerto del Triunfo more were found in the coyol growth under heavy forest than were noted in the open woodland about the town. Conversely, on Volcán de San Miguel, they were much more common in the scrubby, open, second growth at edge of the lava than in the coffee shade a few hundred feet lower.

Pepper-shrikes are, superficially at least, simply large vireos, which they very much resemble in their general habits. The present species has a harsh, scolding note and a warble which is an almost exact duplicate, except for the greater volume, of that of *Vireo gilvus*. The song, which is heard only in spring, is one of the most beautiful bird songs in the tropics. It, too, is vireo-like and suggestive of *Vireo solitarius*, but no two individuals produce it in the same manner. One never becomes tired of listening for new variations.

Nesting. A female taken at Lake Olomega April 7, 1926 was laying.

Colors of soft parts. - Adult, sexes alike: iris, bright orange-red or bright reddish-orange; maxilla, light reddish-brown; mandible, light plumbeous-blue; tarsi and feet, flesh color, usually tinged with lilac; feet, usually paler than tarsi.

Family VIREONIDAE. Vireos

Vireo pallens ochraceus Salvin. OCHRACEOUS VIREO.

Vireo ochraceus Salvin, Proc. Zool. Soc. Lond., p. 188, 1863 San José, Guatemala.

Specimens collected.—Puerto del Triunfo, 1 (January 24, 1926); Barra de Santiago, 7 (March 31 to April 8, 1927).

Status. - Fairly common and presumably resident in the mangrove lagoons coastwise, from the Guatemala border to Puerto del Triunfo.

Remarks. - These vireos are confined absolutely to the mangroves and do not occur even at a short distance inland (pl. XXI). During the winter months they are silent and extremely difficult to collect, but in spring when males are singing, one gains a more comprehensive idea of their real numbers. In favorable localities two or three may be heard singing at once, usually in the higher mangroves back from the tide channels. To reach them necessitates a laborious climb over many yards of interlaced roots and "knees," with the more than probable chance that by the time the tree is reached, the bird will have moved another hundred yards. Moreover, it is useless to shoot them except at low tide or when the flood tide has reached its peak, for at any other time the fallen bird will be swept out of sight in a few moments. The eight specimens collected represent more hard work than the taking of any other eight skins in El Salvador.

In color there is comparatively little individual variation, but the one midwinter bird from Puerto del Triunfo (because in fresh plumage) is yellower throughout than are the spring specimens.

Colors of soft parts. - Maxilla, plumbeous brown; mandible, bluish flesh; tarsi and feet, light, brownish plumbeous; iris, stone-gray.

Vireo pallens pallens Salvin. PALE VIREO.

Vireo pallens Salvin, Proc. Zool. Soc. Lond., p. 188, 1863—Punta Arenas, Costa Rica.

Specimens collected.—Puerto del Triunfo, 1 (January 12, 1926).

Status.—Uncertain, but probably resident in the mangroves from Puerto del Triunfo to the Gulf of Fonseca.

Remarks.—The proper systematic treatment of the mangrove vireos at Puerto del Triunfo must await the collecting of further material. The single specimen recorded above is not distinguishable from western Nicaraguan examples of *pallens* even though it was collected at a place where a typical example of *ochraceus* was secured. This might be considered as indicative that *pallens* and *ochraceus* are distinct species, but the geographic behavior of the species in northern Yucatán will scarcely allow of such a view. The race *salvini* of the islands off the north coast of the Yucatán Peninsula is a virtual color duplicate of *pallens* and is connected with *Vireo pallens semiflavus* of the adjacent mainland through individual variation.

Vireo bellii bellii Audubon. BELL'S VIREO.

Vireo bellii Audubon, Birds Amer., oct. ed., 7, p. 333, pl. 485, 1844—near St. Joseph, Missouri.

Specimens collected.—Divisadero, 1 (October 20, 1925); Barra de Santiago, 3 (April 5 to 9, 1927).

Status.—Fall and spring migrant through the lowlands of the Arid Lower Tropical Zone.

Remarks.—Bell's vireo was decidedly rare in the fall migration, and the single specimen taken in a mimosa thicket at Divisadero constitutes the only record for the southbound migration. From April 5 to 9, 1927 a marked wave of this species was migrating through the beach scrub and more open parts of the woodland at Barra de Santiago. As the males were then in full song, they were naturally more conspicuous than would otherwise have been the case. Even so, it was obvious that large numbers were passing through, and in the low growth along the peninsula as many as a dozen birds were in sight or sound at one time. The evidence of a fall and spring migration in El Salvador, without the detection of a single winter visitant, argues that some individuals, at least, winter considerably to the southward.

Although the four specimens taken are best referable to *bellii*, two of them are not typical of that race, but incline somewhat toward *medius*, the form breeding in southwestern Texas and north central Mexico. They are probably from an intermediate region.

Vireo flavifrons Vieillot. YELLOW-THROATED VIREO.

Vireo flavifrons Vieillot, Ois. Amér. Sept., 1, p. 85, pl. 54, Sept. 1807 [1808]—eastern United States.

Specimens and records.—Rio Goascorán, 2 (October 27, 1925); Mt. Cacaguatique, 1 (November 30, 1925); San José del Sacare, 1

(March 17, 1927); San Salvador, 1 (April 8, 1912). Also noted at Divisadero (October 3, 1925); Mt. Cacaguatique (all through December, 1925).

Status. Uncommon in fall, winter and spring from 100 to 3,600 feet altitude. Extreme dates of arrival and departure were October 3 and April 8.

Remarks.—The yellow-throated vireo was much less frequently encountered than any other of the visiting species of vireos, but this seeming rarity may be due in part to the fact that the yellow-throated population is spread over the coastal plain as well as the foothills. This species tends to be solitary as far as association with its own kind is concerned, although at Rio Goascorán three individuals were found together. Most of the specimens taken or observed were with small flocks of warblers or other vireos.

Vireo solitarius solitarius (Wilson). BLUE-HEADED VIREO.

Muscicapa solitaria Wilson, Amer. Orn., 2, p. 143, pl. 17, fig. 6, 1810—near Philadelphia, Pennsylvania.

Specimens collected.—Mt. Cacaguatique, 7 (November 21 to December 18, 1925); Los Esesmiles, 3 (February 19 to March 5, 1927); San Salvador, 2 (February 24, March 23, 1912); Volcán de San Miguel, 1 (March 26, 1926).

Status.—A common winter visitant everywhere above 2,000 feet. Occurs in all zones, to at least 8,000 feet altitude. The date of arrival is unknown, but the species lingers in spring until March 26 at least.

Remarks.—The center of abundance of this very common winter visitant was along the upper edge of the Arid Lower Tropical Zone, in other words in the coffee districts at about 3,500 altitude. In numbers it compared favorably with the warbling and Philadelphia vireos, but of course was much more in evidence. The smaller species are ordinarily silent or at least do not sing, but the familiar song of *solitarius* may be heard throughout the winter. This species, far more than the warbling and Philadelphia vireos, was likely to accompany the composite flocks of visiting warblers.

There was no noticeable spring migration, and for this reason it seems probable that the vast majority of blue-headed vireos in El Salvador were present simply as winter visitors. After March 1 they became noticeably fewer in number, and after the middle of that month only occasional birds were to be found.

Vireo solitarius montanus van Rossem. HIGHLAND SOLITARY VIREO.

Vireo solitarius montanus van Rossem, Trans. San Diego Soc. Nat. Hist., 7, No. 24, p. 285, Oct. 6, 1933—Hacienda Chilata, Dept. Sonsonate, El Salvador; Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 8, p. 130, 1935—Salvador.

Specimens collected.—San José del Sacare, 1 (March 13, 1927); Hacienda Chilata, 1 (April 23, 1927).

Status.—Probably a permanent resident (though detected only in spring), in the pine-oak association in the interior and in the lower mountains coastwise.

Remarks.—This vireo is probably more common than the taking of only two specimens would indicate. A total of fifteen solitary vireos were taken purely as a routine matter in order to secure locality and altitude data and without a thought that a resident race might be present. Not until a male in breeding condition and full song was taken at Chilata on April 23, nearly a month after the last *solitarius* had departed, was it realized that more than one race was represented. Soon after this date we left the locality, and none of the stations subsequently visited were in territory suitable for the species.

This subspecies, which is also known from the interior mountains of Guatemala, is very similar to *Vireo solitarius cassinii* of western North America, but has a shorter wing combined with a very much longer outer primary.

Vireo olivaceus olivaceus (Linnaeus). RED-EYED VIREO.

Muscicapa olivacea Linnaeus, Syst. Nat., ed. 12, 1, p. 327, 1766—South Carolina.

Specimen collected.—San Salvador, 1 (April 1, 1912).

Status.—Detected only as a rare spring migrant in the foothills of the Lower Tropical Zone.

Remarks.—Only one specimen, unequivocally the red-eyed vireo, was taken. It is probable that the great majority of those passing through Central America migrate along the eastern coast.

Vireo olivaceus flavoviridis (Cassin). YELLOW-GREEN VIREO.

Vireosylvia flavoviridis Cassin, Proc. Acad. Nat. Sci. Phila., 5, p. 152, pl. 11, 1851—Panama and San Juan de Nicaragua (=Nicaragua).

Specimens collected.—Lake Olomega, 18 (July 28 to September 2, 1925; April 6 to 10, 1926); Volcán de San Miguel, 1 (March 25, 1926);

Divisadero, 1 (October 12, 1925); San Salvador, 4 (April 1 to 12, 1912); Hacienda Chilata, 5 (April 21 to 27, 1927); Lake Guija, 3 (May 23 to 26, 1927); San Sebastián, 1 (July 28, 1912); Zapotitán, 1 (June 10, 1912); Lake Chancico, 1 (May 16, 1912).

Status. Common summer visitant, below 2,500 feet, throughout the Arid Lower Tropical Zone. The center of abundance is below 1,500 feet. Extreme dates of arrival and departure are March 25 and October 18.

Remarks.— Included in the specimens listed from Lake Olomega are six birds taken during a migration wave from August 9 to 18, 1925 which are not referable to any named race, but which, collectively, bridge the gap between *olivaceus* and *flavoviridis*.¹ The breeding area of these intermediates remains to be discovered, but certain specimens from Tamaulipas in the collection of the Biological Survey resemble, in some respects, the migrants appearing in El Salvador. At any rate, it is evident that *flavoviridis* is not a distinct species, but must be regarded as a race of *olivaceus*.² While it is true that the songs of the red-eyed and yellow-green vireos are sufficiently different to be easily distinguished in the field, this can scarcely be accepted as proof (as one noted ornithologist would have us believe) of specific difference. No one who has listened to the feeble efforts of the song sparrows of the Santa Barbara Islands of California or to the harsh, jaylike notes of the San Clemente Island towhee would ever imagine, did he not know such to be the case, that he was hearing subspecies which were only slightly differentiated in plumage characters from those on the adjacent mainland.

The breeding birds of El Salvador appear to be typical *flavoviridis*, and we can detect no differences between them and a series from Panama and eastern Mexico in the collections at the United States National Museum. Measurements of the seventeen breeding males are: wing, 75 80 (77); tail, 50 56 (53.5).

It is not generally known that *flavoviridis* is a migratory race that seems to be totally absent from Mexico and at least the northern part of Central America during the winter months. In El Salvador, not one individual was taken or noted between the dates of October

¹ Three of these specimens have subsequently been found to be referable to the race of northwestern Mexico—*Vireo olivaceus hypoleucus* van Rossem and Hachisuka, Proc. Biol. Soc. Wash., 50, p. 159, Sept. 30, 1937. The other three remain subsp. indet.

² Zimmer (Field Mus. Nat. Hist., Zool. Ser., 17, no. 7, pp. 413-414, 1930) has reached similar conclusions in regard to the relationships of *V. olivaceus* and *V. chivi*.

12 and March 25. Although the first spring arrival was noted March 25, it is not until the first week in April that one begins to see many birds. By the 10th of that month the woods of the foothills and lowlands are full of singing males which have arrived somewhat in advance of their future mates. Although the first males were taken as early as March 25, the first females did not put in their appearance until April 10, nearly two weeks later. By the end of April the number of yellow-green vireos to be seen is markedly less than during the first part of that month, and the inference is that numbers pass on through, bound for some more northern breeding ground. By the time breeding commences, yellow-green vireos are relatively about as common as are red-eyed vireos in favorable localities in the eastern United States.

The type of cover preferred by the yellow-green vireo is light, semiopen woodland. Thin second growth is usually a very good situation. However, there are few patches of woodland anywhere below about 2,500 feet which do not have their numerous breeding pairs. The song is decidedly of the red-eye type, but is shorter and more broken. The scolding note is indistinguishable from that of the northern relative.

Nesting. When the birds arrive from the south they are in breeding condition, and it is probable that nesting begins very shortly thereafter. A nest found at Lake Guija May 26, 1927 was of the usual vireo type. It was placed in a horizontal fork near the end of a small branch and only about five feet from the ground. The parent sat so closely that she had almost to be pried from the nest. The four eggs were on the point of hatching, in fact were pipped. They were pure white with small reddish brown spots about the larger end. A male taken at Zapotitán June 10, 1912, was carrying nesting material at the time, although it is probable that nest building at this late date was in preparation for a second laying.

Plumage notes. The postjuvenile body molt is a complete one, but the juvenile remiges and rectrices appear always to be retained. It begins in some of the earlier hatched birds early in July and is complete in most birds by the middle of August. The annual molt of the adults likewise occurs earlier than is usual with the resident passerines and is virtually complete by the first week in August. After the fall molt old and young are indistinguishable in body plumage.

Colors of soft parts. Adults, sexes alike: iris, dark red; maxilla, light brown with mandible paler; tarsi and feet, bright plumbeous-

blue. Juveniles: similar to adults, but mandible tinged with bluish basally and iris brown. The brown iris of the young persists for some time after the postjuvinal molt and probably does not attain full redness until the following spring.

Stomach contents. Berries exclusively, 2; berries and insects, 1; insects exclusively, 1.

Vireo olivaceus forreri Madarasz. FORRER'S VIREO.

Vireo forreri Madarasz, Term. Fuzetek, 9, pt. 1, 85, pl. 6, 1885 Tres Marias Islands, Mexico.

Specimens collected. -Lake Olomega, 1 (April 6, 1926); San Salvador, 1 (April 12, 1912); Hacienda Chilata, 2 (April 24, 1927).

Status.- Uncommon spring migrant along the foothills of the Arid Lower Tropical Zone.

Remarks.- It may be noted that this race occurs in parts of central western Mexico as well as on the Tres Marias Islands. Specimens of *forreri* in the collection of the *Biological Survey* have been examined from the following localities: Jalisco (Barranca Ibarra) 3 specimens all taken May 13, 1892 (Nos. 126,633, 143,388, and 143,389); Guerrerro (Egido Nuevo) 2 specimens May 3, 1903 (Nos. 185,794 and 185,795); (Rio Balsas) 1 specimen June 4, 1903 (No. 185,746); Oaxaca (Tehuántepec) 1 specimen May 20, 1895 (No. 143,396). Curiously enough Nayarit and Sinaloa examples are small and apparently not distinguishable in size from *flavoviridis* of Central America and eastern Mexico. However, they average more olive-green (less yellow) above and slightly paler below.¹

The race *forreri* is larger and has a decidedly longer tail than *flavoviridis* and is a little more olive-green above. The four migratory specimens taken in El Salvador measure: wing, 80-84 (82.5); tail, 59.5-60.5 (60). They have been carefully compared with seven topotypical males of *forreri* in the *Biological Survey* collection and are identical with them.

Vireo gilvus gilvus (Vieillot). EASTERN WARBLING VIREO.

Muscicapa gilva Vieillot, Ois. Amér. Sept., 1, p. 65, pl. 34, Sept. 1807 [1808]-New York.

Specimens and records.-Mt. Cacaguatique, 6 (November 29 to December 12, 1925); Volcán de Conchagua, 4 (February 28 to March 6, 1926); Volcán de San Miguel, 2 (March 18, 28, 1926);

¹ Recently named as *Vireo olivaceus hypoleucus*: see antea under *flavoviridis*.

Chilata, 1 (April 27, 1927). Also noted at San Salvador (April 8, 22, 1912); Colima (January 21, 1927).

Status.—Common winter visitant to the foothills. The species is most common at about 3,000 feet, extending upward into the Arid Upper Tropical Zone to about 4,000 feet and descending rarely to as low as 1,000 feet in the Arid Lower Tropical. Arrival and departure dates: November 29 and April 27.

Remarks.—The winter home of the eastern warbling vireo can now be stated to be in the foothills of El Salvador and adjacent parts of Central America.¹ Although only thirteen specimens were collected, this small number is not indicative of relative abundance, for the species was exceedingly common in certain localities. On Mt. Cacaguatique in late November and in December, 1925, warbling vireos were abundant at 2,500 feet elevation, all through the berry-bearing trees which provided shade for the coffee groves. From there up to the oak- and pine-covered summit of the mountain (about 4,000 feet) they were also very numerous. In February and March, 1926, both on Volcán de Conchagua and Volcán de San Miguel numbers were observed in similar environments at from 2,500 to 3,500 feet, but much less commonly than in the interior. At Chilata in April, 1927, warbling vireos were migrating and were usually in pairs. A male accompanied by another bird was in full song when collected there April 27, 1927. The lowest level at which the species was found was Colima (1,000 feet) in the Lempa River Valley. The single specimen collected there (January 21, 1927) was, through oversight, not prepared as a specimen, and therefore the subspecies is in doubt. However, this, as well as two birds taken at San Salvador April 8 and 12, 1912, but which are not now available for examination, most probably belonged to the eastern rather than to the relatively rare western race.

Plumage notes. A limited spring body molt is apparent in most of the specimens taken in February and March. It is confined principally to the foreparts and interscapular region.

***Vireo gilvus swainsonii* Baird. WESTERN WARBLING VIREO.**

Vireo swainsonii Baird, in Baird, Cassin, and Lawrence, Rep. Expl. & Surv. R. R. Pac., 9, p. 386, 1858—Petaluma, California.

Specimens collected.—Mt. Cacaguatique, 2 (December 3, 1925).

Status.—Comparatively rare midwinter visitant to the higher hills in the interior.

¹ See also Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 316, 1932.

Remarks.—The taking of these two specimens extends, somewhat, the known winter range of the western warbling vireo, which had previously not been detected south of the Guatemalan highlands. As in several other cases where both eastern and western forms of a species were found to be present, the western was definitely in the minority. A survey of the list of winter records shows that the range of *swainsonii* at that season centers considerably farther north than does that of *gilvus*.

Vireo philadelphicus (Cassin). PHILADELPHIA VIREO.

Vireosylvia philadelphica Cassin, Proc. Acad. Nat. Sci. Phila., 5, p. 153, pl. 10, fig. 2, 1851—near Philadelphia, Pennsylvania.

Specimens collected.—Mt. Cacaguatique, 8 (December 1 to 22, 1925); Volcán de Conchagua, 3 (March 1 to 6, 1926).

Status.—Common winter visitant at the upper limits of the Arid Lower Tropical Zone both along the interior and coastal mountains. Dates of arrival and departure not known.

Remarks.—Philadelphia vireos were common from December 2 to 22, 1925 in the coffee shade at the extreme upper limits of the Arid Lower Tropical Zone on Mt. Cacaguatique and in an exactly similar association on Volcán de Conchagua from March 1 to 6, 1926. At both places the altitude was 3,500 feet and, curiously enough, the species was never seen at any other altitude, even though apparently identical conditions prevailed for at least 500 feet lower. In relative numbers, *philadelphicus* was slightly more common than *gilvus* and invariably outnumbered the latter when especially favorable trees brought the two species together. Sometimes as many as a dozen *philadelphicus* could be found in a single food tree, but otherwise the species was, like most vireos, solitary.

Hylophilus decurtatus pallidus (Dickey and van Rossem).
EL SALVADOR FOREST VIREO.

Parhysylvia decurtata pallida Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 4, January 8, 1927—Puerto del Triunfo, Depto. Usulután, El Salvador.

Hylophilus decurtatus pallidus Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 320, 1932—in text, Salvador (crit.); Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 13, pt. 8, p. 184, 1935—Salvador (crit.).

Pachysylvia decurtata Todd (not *Sylvicola decurtata* Bonaparte), Proc. Biol. Soc. Wash., 42, p. 204, July 16, 1929—part, Salvador (crit.).

Specimens collected.—Lake Olomega, 6 (August 17 to September 1, 1925); Puerto del Triunfo, 1 (January 9, 1926); Chilata, 3 (April 22–29, 1927); Barra de Santiago, 1 (April 8, 1927).

Status. Uncommon resident of the Arid Lower Tropical Zone. The distribution is apparently confined to the coastal plain and to as high as 2,000 feet in the Balsam Range.

Remarks. Todd, in his recent revision of the genus, considered this race to have characters too slight for recognition. However, we hold it, after examination of more specimens than were available when it was originally described, to be a valid form. Its range extends for a short distance into western Nicaragua (see also Hellmayr, sup. cit.) but apparently not into western Guatemala. Everything considered, it seems to be a race confined to the San Miguel District. It is a pale race, with whiter throat and median underparts.

These little vireos are strictly forest birds and were never found in undergrowth, or for that matter less than about thirty or forty feet from the ground. For this reason they were very difficult to see, and on the rare occasions when a flock was found relatively low down, say in the thin middle heights of tall jungle, one had to make the most of the opportunity. The extraordinary color resemblance of this species to the Tennessee warbler (an extremely abundant winter visitant and migrant) naturally made the detection of *Hylophilus* even more difficult. At close range, there are conspicuous differences between the two, not only in profile, but also in call-notes. Usually one simply has snapshots at a tiny, greenish bird in foliage fifty feet or more overhead.

This species, for a vireo, is extremely sociable and except during the nesting season in spring habitually travels in flocks of from four to six individuals. These groups are in turn usually part of much larger flocks composed for the most part of blue honey creepers, visiting warblers, and the like.

Nesting. April specimens were all in breeding condition. The birds taken at Lake Olomega in August were for the most part young of the year just finishing the postjuvenile molt.

Plumage notes. There is no molt of either primaries or secondaries in four young of the year, taken August 17 to September 1, although in all of these the postjuvenile body plumage has been nearly fully acquired. Two adults taken at the same time have nearly completed the annual (postnuptial) molt.

Colors of soft parts.—Adults and immatures alike: iris, dark brown; maxilla, pale plumbeous; mandible, bluish flesh-color; tarsi and feet, light plumbeous blue.

Stomach contents.—Insects exclusively, 6.

Family COEREBIDAE. Honey Creepers

Cyanerpes cyaneus carneipes (Selater). CENTRAL AMERICAN BLUE HONEY CREEPER.

Coeerba carneipes Selater, Proc Zool Soc Lond, p 376, 1859 Playa Vicente, Oaxaca, Mexico.

Specimens collected. Puerto del Triunfo, 15 (January 2 to 17, 1926); Rio San Miguel, 5 (February 2 to 12, 1926); Chilata, 3 (April 23, 25, 1927); Volcán de San Salvador, 2 (May 31, 1912); Hacienda Zapotitán, 1 (June 19, 1927).

Status.—Common summer resident in a small area centered by the Balsam Range. Apparently winters entirely in the coastal plain in the Oriente, a region from which it is entirely absent in summer. The vertical range in summer is 1,500 to 4,500 feet and in winter from sea level to 250 feet (fig. 24).

Remarks. The blue honey creeper is one of the very few, local, resident birds which have distinct summer and winter ranges. Extensive collecting in the lowlands of the Oriente during the summer months failed to disclose a single individual, whereas in midwinter the species was literally swarming there. The Balsam Range seems to be the center of the limited breeding area, for *Cyanerpes* was very common there in pairs and preparing to breed in April, 1927. A good many were noted also at Zapotitán in June, 1927, and a few on Volcán de San Salvador in May, 1912. No trace of it was found anywhere in the interior, nor on Volcán de Santa Ana, where it seems to be replaced by *Diglossa*.

Both Zapotitán and Chilata are well within the Arid Lower Tropical Zone, although by no means a part of the "tierra caliente." On Volcán de San Salvador the species was detected only about the lower edge of the cloud forest at an elevation of 4,500 feet. Search in a similar environment on Volcán de Santa Ana produced only negative results.

The extreme abundance of honey creepers in winter on the coastal plain of the Oriente leads to speculation as to whether all of them came from the limited breeding area in El Salvador. The flocks found at Puerto del Triunfo numbered frequently as many as a hundred and seldom less than a score. It was not unusual to meet with a dozen flocks daily. At Rio San Miguel in February they were perhaps slightly less numerous, but still were among the commonest species to be found there.

This is an intensely active bird, and at times one becomes almost dizzy watching a flock ceaselessly crisscrossing about through the foliage overhead. The flock retains its unity even when feeding and does not scatter out. The constant movement, not only of the individual members, but of the flock itself, makes detection easy and large numbers must fall prey to hawks on this account. The Central American broadwing (*Buteo magnirostris direptor*) is a common forest species and probably takes a heavy toll. At Puerto del Triunfo one of these hawks was seen watching a flock of honey creepers work through the foliage until they were directly beneath it, when with a flip downward it picked off a bird with a dexterity which showed long practice.

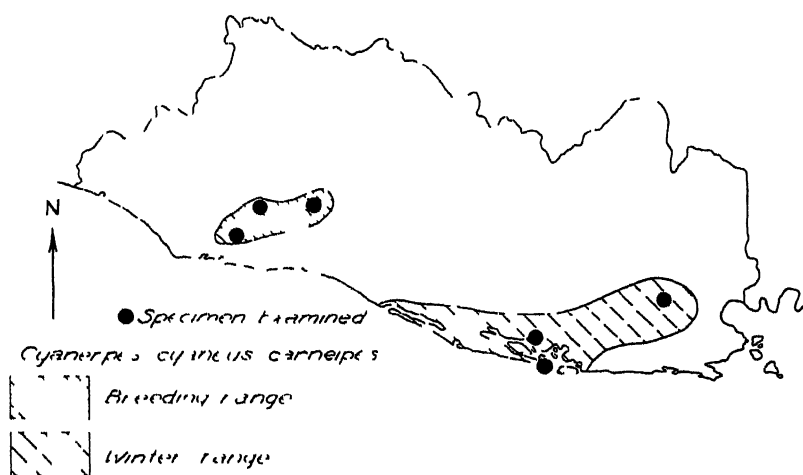


FIG. 24. Seasonal distribution of the blue honey creeper, *Cyanerpes cyaneus carnelius*, in El Salvador.

Nesting. Specimens in breeding condition were taken at Chilata in late April, on Volcán de San Salvador in late May, and at Zapotitán in mid-June.

Plumage notes. In postjuvénal plumage the sexes are very similar; in fact there seems no certain method aside from the larger size of the males by which to distinguish them during the short interval in which the postjuvénal body plumage is worn complete and the wing molt not yet started. The wing molt commences after the postjuvénal body plumage is complete and is finished by the middle of January. The black wings of the young males then form a conspicuous sex mark visible at some distance, although the body plumage of both males and females is still alike.

Scarcely is the postjuvenile wing molt complete when the first prenuptial molt begins. This is a complete body and tail molt in both sexes, but is of course much more noticeable in the males. At this time (January 1 to February 15) the males take on the black and blue plumage of maturity and are then not to be distinguished from adult birds. The molt is a very gradual one, beginning on the rump and thighs and then as scattered feathers everywhere. The cerulean crown patch and the chin are the last areas to be affected. Thus the young males have four distinct plumage combinations the first year of their lives the juvenal plumage, the green postjuvenile plumage with greenish juvenal wings, the green postjuvenile plumage with black postjuvenile wings, and the black and blue prenuptial or first spring plumage. The curious part of this program is that each step is nearly complete before the subsequent step is initiated.

Color of soft parts. Adult male: iris, dark brown; bill and claws, black; tarsi and feet, bright coral-red. Postjuvenile male: similar, but tarsi and feet, orange-red, duller than those of adult males. Adult and immature females: similar, but base of mandible plumbeous; tarsi and feet, dull, dark, brownish red.

Stomach contents.—None examined. At Puerto del Triunfo these honey creepers came in numbers to a clump of orange trees, much of the fruit of which had been drilled by woodpeckers (*Centurus santacruzi*). These openings in the fruit brought swarms of insects which, in turn, may have been the main attraction for the honey creepers rather than the fruit itself.

***Diglossa barbitula montana* Dearborn. MOUNTAIN HONEY CREEPER.**

Diglossa montana Dearborn, Field Mus. Nat. Hist., Orn. Ser., 1, no. 3, p. 125, November, 1907 Sierra Santa Elena, near Teepam, Guatemala (altitude 9,500 feet).

Specimens collected. Los Esesmiles, 7 (February 4 to 23, 1927); Volcán de Santa Ana, 3 (May 8 to 14, 1927).

Status.—Uncommon resident of semiopen forest areas in the Humid Upper Tropical Zone on Los Esesmiles and Volcán de Santa Ana. The vertical range is from 5,000 to 8,500 feet.

Remarks.—The present form is very distinct by reason of the gray throat and very much darker underparts when compared with *D. b. barbitula* of Mexico. The finding of *montana* in El Salvador constitutes a significant range extension, for it indicates an extended range in the high mountains of Honduras also.

This is a true cloud forest species which is seldom found even as low as 5,000 feet. It seems to be nowhere common. On Los Eses-miles in February only four or five flocks of from six to about ten birds each were encountered in undergrowth or foliage close to the ground. Contrary to *Cyanerpes*, which was found at times to be ridiculously tame, *Diglossa* was very shy, and not more than two specimens were ever taken from a flock before the rest disappeared entirely. In May on Volcán de Santa Ana only single birds were found, none of which were in breeding condition. This evidence tends to show that the family parties break up after the midwinter molting period and that thereafter individuals range singly until the next breeding season.

Nesting. Two ages of young birds were taken on Los Esesmiles during February, one in fresh postjuvénal plumage, the other in pure juvenal plumage and obviously out of the nest for a few weeks at most.

Plumage notes. The molt program of *Diglossa* differs radically from that of *Cyanerpes*. Both males and females have a postjuvénal plumage representing in each sex an intermediate color step to that of maturity. The postjuvénal male is essentially similar to the fully adult male, that is, with underparts brownish cinnamon, but it is decidedly less slaty, more olive, on the upperparts.

Colors of soft parts. Adults: iris, dark brown; bill, brownish black with basal two-thirds of mandible flesh-colored laterally; tarsi and feet, dark brown. Juveniles: similar to adults, but bill dark brown instead of blackish.

Family COMPSOTHTLYPIDAE. Wood Warblers

Mniotilta varia (Linnaeus). BLACK AND WHITE WARBLER.

Motacilla varia Linnaeus, Syst. Nat., ed. 12, 1, p. 333, 1766—Santo Domingo.

Specimens and records. Lake Olomega, 2 (August 30, 1925); Monte Mayor, 1 (October 8, 1925); Mt. Cacaguatique, 3 (December 2 to 11, 1925); Rio San Miguel, 1 (February 9, 1926); Volcán de Conchagua, 1 (March 3, 1926); San José del Sacare, 1 (March 13, 1927); Barra de Santiago, 1 (April 9, 1927); San Salvador, 1 (April 10, 1912). Also noted on Volcán de San Miguel (March 13, 1926).

Status.—Rather uncommon fall and spring migrant and winter visitant. Noted from sea level to 4,000 feet. Dates of arrival and departure are August 30 and April 10.

Remarks. Although generally distributed in wooded country between sea level and 4,000 feet, the black and white warbler was not to be classed as common anywhere. During the fall of 1925 two specimens were taken at Lake Olomega on August 30, but no more were seen until September 1 when several were noted, all singly, in the woods on the south side of the lake. On Mt. Cacaguate, where they showed decided preference for the oaks, not more than one or two a day were observed between November 20 and December 21. The only approach to a definite migration noted in the case of this species was at Barra de Santiago, where several individuals were seen in the mangroves and beach scrub on April 8 and 9, 1927.

***Helmitheros vermivorus* (Gmelin). WORM-EATING WARBLER.**

Motacilla vermivora Gmelin, Syst. Nat., 2, p. 951, 1789 Pennsylvania.

Specimens collected.—Mt. Cacaguate, 2 (December 7, 18, 1925); Volcán de Conchagua, 1 (March 3, 1926); Barra de Santiago, 1 (April 8, 1927).

Status.—Rare midwinter visitant and spring migrant between sea level and 3,500 feet.

Remarks.—Little is known concerning the local occurrence of this semiterrestrial warbler. The four specimens cited above are the only instances in which it was detected. All four of the birds were solitary and were found on or near the ground in damp, shady situations.

***Vermivora peregrina* (Wilson). TENNESSEE WARBLER.**

Sylvia peregrina Wilson, Amer. Orn., 3, p. 83, pl. 25, fig. 2, 1811—Cumberland River, Tennessee.

Specimens and records. Divisadero, 4 (October 13 to November 12, 1925); Mt. Cacaguate, 3 (December 1 to 19, 1925); San Salvador, 6 (February 23 to April 25, 1912); Volcán de San Miguel, 1 (March 13, 1926); Barra de Santiago, 1 (April 8, 1927); Lake Olomega, 1 (April 9, 1926). Also noted at Rio Goascorán (November 2, 1925); Volcán de Conchagua (February 25, 1926); Puerto del Triunfo (all through January, 1926).

Status.—Common fall and spring migrant and winter visitant throughout the Arid Lower Tropical Zone and locally in the oak association of the Arid Upper Tropical. Although noted from sea level to 4,000 feet altitude, this species is most common in the foothill districts up to about 3,500 feet. Dates of arrival and departure are October 13 and April 25.

Remarks.—During the fall migration of 1925, Tennessee warblers arrived in the vicinity of Divisadero on October 13. No advance guard, that is, individuals arriving ahead of the main flights, was observed in this case. On the above-mentioned date they were suddenly found to be present in numbers, and from then on were common in every lowland or foothill locality visited. In point of relative abundance this was by far the most common warbler (resident or migratory) throughout the coastal plain and in the foothills, but it was greatly outnumbered by *Dendroica virens* above 3,000 feet.

The manner of occurrence was usually as small flocks of six or eight or even twenty or more birds. These combined with several other species to make up larger flocks which worked ceaselessly through the crown foliage of low, semiopen woodland. However, many were found even in the tall, dense swamp forests along the coast and also in the oak woods on Mt. Cacaguetique.

The northward migrations started about April 1 and were characterized by decided waves. During the first ten days of that month Tennessee warblers at times were very common and at intervals were almost totally absent in the same locality. After the 15th very few were to be seen, and the last specimen of record was taken April 25.

Plumage notes.—The spring (prenuptial) molt begins in late February and is not finished before about the middle of March. The molt involves most of the anterior body plumage, but progresses so slowly that this species never has the ragged "pin-feathered" appearance so often seen in *Dendroica aestiva* at the spring molt.

Vermivora superciliosa superciliosa (Hartlaub). HARTLAUB'S WARBLER.

Conirostrum superciliosum Hartlaub, Rev. Zool., p. 215, 1844—Guatemala.

Specimens collected. Los Esesmites, 1 (February 17, 1927); Volcán de Santa Ana, 9 (May 6 to 17, 1927); Mt. Cacaguetique, 1 (December 7, 1925).

Status. Fairly common breeder in the Humid Upper Tropical Zone on Volcán de Santa Ana. In midwinter occurs also in the same zone on Los Esesmites and in the Arid Upper Tropical on Mt. Cacaguetique. The vertical range is 3,500 to 8,000 feet.

Remarks. -In absence of other than color characters by which to distinguish *Oreothlypis* we follow Miller and Griscom¹ in considering

¹ Amer. Mus. Novit., 183, pp. 7-8, 1925.

that the generic name is synonymous with *Vermivora*. The same authors have described a race, *Vermivora superciliosa parva*, from the mountains near Jinotega, Nicaragua, basing their name on the small size of a single specimen, a male. If later material proves *parva* to be a valid form, it must be very restricted in range, for neither of the two males from Los Esesmiles and Mt. Cacaguatique can be distinguished from typical *superciliosa*. By the analogy of other species one would expect both of these specimens to show at least an approach to the Nicaraguan bird in characters. The measurements of the type and only known example of *parva* closely approximate those of females of *superciliosa*.

Specimens from El Salvador are typical of *superciliosa* and measure as follows:

	Wing	Tail
8 males	59-62	42-45
3 females	55-57	41-42.5

Except for the few birds found in the oaks on Mt. Cacaguatique, Hartlaub's warbler was found to be entirely confined to the cloud forests of the Humid Upper Tropical Zone. The single Los Esesmiles specimen was taken in the foliage of a tall, parasite-covered oak at 8,000 feet, while the nine birds from Volcán de Santa Ana were all found in similar situations (i.e., moss-covered hardwoods) in the cloud forest at altitudes ranging from 5,000 to 7,000 feet. They were most common above 6,500 feet in this latter locality and in lesser numbers at the 5,000 foot level.

The call-notes were puzzling in their variety. In the winter on Mt. Cacaguatique, the following observations were recorded: "I was surprised to hear, high up in the tops of the tallest oaks, a piping and trilling so very similar to the notes of the pygmy nuthatch that I was almost convinced that they could come from no other bird. Finally I located two or three small birds in the topmost branches of a hundred-foot oak. There were a good many warblers of various species present, most of them among the leaves of the crown, but a few were working the bare branches." After an interval one "flew down from the treetop and commenced working a large branch only about thirty feet overhead. It gave the "nuthatch" notes several times while I was trying to get a shot. The actions were very similar to those of a black and white warbler. I finally shot it from the under side of the branch." These piping notes were heard at other times, and by following them up another Hartlaub's warbler, which was prepared as a skeleton, was collected. However, the single Los Esesmiles

bird gave only a "quick *chirr* very much like that of a chipping sparrow." During the three weeks spent on Volcán de Santa Ana where the species was relatively common, the song was summarized as a "cicada-like *chirr*, very deceptive as to its whereabouts" and the alarm note as a "thin, weak chip" similar to that of a Tennessee warbler.

Nesting.—All specimens taken in May, 1926, on Volcán de Santa Ana were obviously breeding at the time.

Plumage notes.—There appears to be not even an average color difference between the sexes. The breast spot varies greatly in size and depth of color, but such variation is, on the basis of the present carefully sexed series, purely individual in nature. There remains the possibility that age may be in part responsible.

Colors of soft parts.—Adults: bill, black; base of mandible, pale, brownish flesh-color; tarsi, plumbeous brown; feet, paler; iris, dark brown.

Compsothlypis americana pusilla (Wilson). NORTHERN PARULA WARBLER.

Sylvia pusilla Wilson, Amer. Orn., 4, p. 17, pl. 28, fig. 3, 1811—Philadelphia, Pennsylvania.

Specimen collected.—Barra de Santiago, 1 (April 8, 1927).

Status.—Rare spring migrant in the Arid Lower Tropical Zone.

Remarks.—The single specimen of the northern parula warbler taken in El Salvador was collected in the swamp forest just back of the mangroves at Barra de Santiago. On April 8, 1927 there was a very noticeable migration wave of many small migratory species passing through the locality, and this circumstance presupposes the specimen to have been a migrant rather than a belated winter visitant.

Peucedramus olivaceus micrus Miller and Griscom. NICARAGUA OLIVE WARBLER.

Peucedramus olivaceus micrus Miller and Griscom, Amer. Mus. Novit., 183, p. 10, July 18, 1925—San Rafael del Norte, Nicaragua.

Specimens collected.—Los Esesmites, 5 (February 6 to 21, 1927).

Status.—Present in winter and probably resident in the pine association on Los Esesmites. Detected only at 7,000 feet.

Remarks.—The five specimens of this southernmost race of the olive warbler are typical and verify with one exception all of the

characters ascribed to it by Miller and Griscom, who had but two specimens available when they named the Nicaraguan race. On the basis of the El Salvador series we are unable to verify the actually wider base of the bill, though relatively speaking the bills are both wider and shorter than in the more northern forms. It may be proper to state here that we are in complete accord with Miller and Griscom on the division of this species into several races. Why these are lumped, as is done in the Fourth Edition of the A. O. U. Check-list, is difficult to understand.

The measurements of our specimens are as follows:

	Wing	Tail	Exposed Culmen
2 adult males	68 -69	47 -47.5	10 -10.4
2 adult females	65 -65	44.5-45	9.3- 9.4
1 immature male	64.5	45	10

Olive warblers were very rare and local. All of our specimens were collected in one pine grove at an elevation of 7,000 feet, and the species was found nowhere else. Several were heard besides those taken, and it is probable that they constituted a small colony. There is every reason to believe they were resident, for they occurred only in pairs and were rapidly approaching breeding condition.

That the first-year males breed while still in the yellow "female" plumage is shown by the single example of that age which was shot. It was ready to breed when collected (February 21) and was accompanied by another bird, probably its mate.

The call-note, once heard, is unmistakable and resembles nothing so much as the cheep of a newly hatched, barnyard chick.

Colors of soft parts.—Sexes alike: iris, dark brown; bill, dull black; tarsi and feet, dark plumbeous.

***Dendroica aestiva aestiva* (Gmelin). EASTERN YELLOW WARBLER.**

Motacilla aestiva Gmelin, Syst. Nat., 1, pt. 2, p. 996, 1789—Canada.

Dendroica aestiva Salvin and Godman (not *Motacilla aestiva* Gmelin?), Biol. Centr.-Am. Aves, 1, p. 124, 1880—La Unión; La Libertad; Baird, Rev. Am. Birds, 1, p. 195, 1872—La Libertad.

Specimens collected.—Lake Olomega, 8 (August 1 to September 2, 1925; April 10, 1926); Monte Mayor, 1 (October 8, 1925); Chilata, 1 (April 24, 1927).

Status.—Common fall and spring migrant through the Arid Lower Tropical Zone. Fall migration dates are from August 1 to October 8, and spring records are from April 10 to 24.

Remarks.—The eastern yellow warbler migrates through El Salvador in fair numbers, but no specimens were taken at any time

during the winter. In the fall, particularly, great numbers are in evidence. The first arrivals reached Lake Olomega on August 1, but the main body did not begin to drift through until about the middle of that month. On the 16th they were very common, and the numerical peak was reached on September 3. The very last example noted was one collected at Monte Mayor on October 8, 1925. It is probable that the great majority of the yellow warblers seen in the fall in lowland localities belonged to this form. In the spring only two specimens of *aestiva* were collected. The maximum altitude for *aestiva* was 2,000 feet at Chilata.

Plumage notes.—Both adults and young of the year were in complete fall (postnuptial) plumage by the time they arrived. In the case of specimens taken as early as August 1, this would necessitate commencing the annual molt very close to July 1. An adult male taken April 10 is in the midst of the spring (prenuptial) molt and presents an extremely ragged appearance. Another, collected on April 24, has entirely finished this molt.

***Dendroica aestiva rubiginosa* (Pallas). ALASKA YELLOW WARBLER.**

Motacilla rubiginosa Pallas, Zoogr. Rosso-Asiatica, 1, p. 496, 1811—Kodiak, Alaska.

Specimens collected.—San Salvador, 3 (February 24 to April 1, 1912); Volcán de San Miguel, 4 (March 13 to 24, 1926).

Status.—Noted only as a fairly common spring migrant through the higher parts of the Arid Lower Tropical Zone at elevations of from 2,300 to 3,000 feet.

Remarks. This race was found only as a fairly common spring migrant through the upper levels of the Arid Lower Tropical. As with *aestiva* the winter range undoubtedly lies farther to the south. It is notable that *rubiginosa* occurs at somewhat higher elevation than the other three forms and was not found at all in the "tierra caliente."

Plumage notes. The specimens taken are in various stages of the very extensive spring molt. The new plumage shows only as scattered feathers on the breast in two males taken February 24 and March 9, respectively; three males collected on March 13, 16, and 24 are approximately half in new plumage, half in old, while two more taken March 22 and April 2 have to all intents finished the molt. The prenuptial molt of the yellow warbler involves an apparently complete change of the body plumage.

***Dendroica aestiva morcomi* Coale. ROCKY MOUNTAIN YELLOW WARBLER.**

Dendroica aestiva morcomi Coale, Bull. Ridg. Orn. Club, 2, p. 82, April, 1887
Fort Bridger, Wyoming

Specimens collected. Lake Olmstead, 3 (August 1 to September 10, 1925); Divisadero, 2 (September 23, 30, 1925); Rio San Miguel, 1 (February 4, 1926); San Salvador, 2 (March 13, 28, 1928); Barra de Santiago, 2 (March 31, April 9, 1927).

Status.—Common spring and fall migrant and winter visitant in the lowlands. Dates of arrival and departure are August 1 and April 9.

Remarks.—The race of yellow warbler summering in the Great Basin and Rocky Mountain regions of the United States of late years has been generally overlooked and has been synonymized commonly with *aestiva* or, in part, with *brewsteri*. Although not a well-differentiated form, its characters are readily apparent in series, and there is no reason why it should not be accorded equal standing with the races currently recognized. The underparts of the males are heavily marked, and in this respect *morcomi* is not distinguishable from *aestiva*. Dorsally, however, *morcomi* is darker and less yellowish green, particularly on the interscapular region. The females are, age for age, more buffy (less yellowish) below and darker and more grayish above than the females of *aestiva*. In comparison with *brewsteri*, *morcomi* (particularly the bill) is larger, and the males are more heavily streaked below. The range of *morcomi* is the Rocky Mountain region of the United States, north to Wyoming and Idaho, west to the eastern slope of the Sierra Nevada, and south (in the western part of its range) to Mammoth, Mono County, California. We have not seen material from the southern Rocky Mountains; so we cannot state the southern limits in that region.

Plumage notes.—The spring (prenuptial) molt takes place at about the same time as in *aestiva* and *rubiginosa*.

***Dendroica aestiva brewsteri* Grinnell. CALIFORNIA YELLOW WARBLER.**

Dendroica aestiva brewsteri Grinnell, Condor, 5, p. 72, 1903- Palo Alto, California.

Specimens collected.—Puerto del Triunfo, 1 (January 23, 1926); San Salvador, 2 (March 28, 1912); Barra de Santiago, 1 (April 8, 1927).

Status.—Winter visitant and spring migrant in the Arid Lower Tropical Zone.

Remarks.—The small Pacific coast race, *brewsteri*, is apparently relatively the least common of the four forms found in El Salvador; at any rate, the small number of specimens taken indicates that this is the case. Yellow warblers were common in January at Puerto del Triunfo and in February at Rio San Miguel, but unfortunately only one specimen was taken at each place. Whether all of these winter birds were *brewsteri* and *morcomi* is problematical.

***Dendroica erithachorides xanthotera* Todd. PACIFIC MANGROVE WARBLER.**

Dendroica bryanti xanthotera Todd, Proc. Biol. Soc. Wash., 37, p. 125, 1924—Puntarenas, Costa Rica.

Specimens and records.—Puerto del Triunfo, 6 (January 12 to 24, 1926); Barra de Santiago, 2 (March 31, April 4, 1927). Also noted at San Sebastián (July, 1912).

Status.—Fairly common resident coastwise, where confined to the tidewater mangrove association.

Remarks.—In addition to the characters given by the original describer, the males of *xanthotera* have the chestnut of the head noticeably darker in series than *castaneiceps*. The females, compared age for age with *castaneiceps*, are brighter and more yellowish green—a fact which is worth mentioning as Todd made no mention of the female in the original description.

The eight specimens of this race which were collected in El Salvador are identical with a series from Punta Piedra, Costa Rica.

The mangrove warbler, in El Salvador as elsewhere, is confined to the narrow, coastwise strip of mangroves (pl. XXI). Local assemblages, therefore, necessarily center about tidal lagoons where the all-necessary mangrove growth is to be found in greatest luxuriance. About such localities as Puerto del Triunfo, Barra de Santiago, and San Sebastián this species is not uncommon, although like all small birds which inhabit this association, it is much more often heard than seen. In searching for birds one is necessarily obliged to keep to the lagoon channels which, no matter how tortuous their windings, seldom lead one to the spot where the bird has been heard singing. To add to the difficulties in the path of the collector, the brown and yellow plumage of the males blends perfectly with the dead or dying mangrove leaves which are kept in continual motion by the sea breeze.

As the entire lives of these birds are spent in an environment which renders them immune from attack by the great majority of the predators which harass species inhabiting the land forest, one is at first inclined to be surprised at their relative scarcity. Raccoons (*Procyon*) are extremely common in the mangroves and were often found prowling about through the branches at night. They, as well as carnivorous iguanas, undoubtedly take toll of many nests, but aside from these two it is difficult to conjecture what natural enemy operates to limit the mangrove warbler population. Certainly no "saturation point" has been reached, for pairs may be separated by as much as a mile even in the areas which appear most favorable.

During the winter months of December and January only single birds were observed. The males sang all through the hot hours, but were silent in the early morning and late afternoon. At both Barra de Santiago in April and at San Sebastián in July, pairs were invariably the rule, and the males were singing at all times of the day.

Plumage notes.—Neither sex attains the full adult plumage the first year. The postjuvenile molt in the males produces the intermediate type, the body plumage of which is about intermediate between adults of the two sexes, with the mottled chestnut and greenish head. The females the first year are decidedly more grayish than adults.

Colors of soft parts.—Not recorded.

***Dendroica magnolia* (Wilson). MAGNOLIA WARBLER.**

Sylvia magnolia Wilson, Amer. Orn. 3, p. 63, pl. 23, fig. 2, 1811 Fort Adams, Mississippi.

Specimens and records. Divisadero, 1 (October 12, 1925); Mt. Cacaguatique, 2 (December 13, 19, 1925); Puerto del Triunfo, 2 (January 2, 11, 1926); San Salvador, 2 (February 24, April 18, 1912); Rio San Miguel, 1 (February 9, 1926); Volcán de San Miguel, 1 (March 20, 1926); Lake Olomega, 2 (April 6, 11, 1926); Chilata, 2 (April 22, 24, 1927). Also noted at San Salvador (April 22, 1912).

Status.—Rare fall migrant, but common winter visitant and spring migrant in the Arid Lower Tropical Zone. Although found from sea level to 3,500 feet, the species is much more numerous below 2,000 feet than above that altitude. Dates of arrival and departure are October 12 and April 24.

Remarks.—The extreme rarity of the magnolia warbler during the fall migration is difficult to explain. The sole record for fall is

that of October 12 at Divisadero. In December perhaps a dozen all told were seen on Mt. Cacaguate, always as single birds with small flocks of Tennessee or other warblers. By January they had become very common, and at Puerto del Triunfo during the whole of that month and in February at Rio San Miguel almost every flock of blue honey creepers was accompanied by one or more magnolia warblers. There was no noticeable decrease in numbers until after the middle of April, and even on the 24th (the last date on which the species was noted) they were recorded as common.

Plumage notes. The very extensive spring (prenuptial) body molt of this species commences about April 1 and is completed very rapidly. It had not yet commenced in a specimen taken March 20, had just begun in one taken April 6, and was nearly finished in four birds taken, respectively, on April 11, 18, 22, and 24.

***Dendroica coronata coronata* (Linnaeus). EASTERN MYRTLE WARBLER.**

Motacilla coronata Linnaeus, Syst. Nat., ed. 12, 1, p. 333, 1766- Philadelphia, Pennsylvania.

Specimens collected. Volcán de San Miguel, 2 (March 12, 22, 1926).

Status. Rare spring migrant in the Arid Upper Tropical Zone on Volcán de San Miguel.

Remarks. One other myrtle warbler, apparently also a female, was seen on March 12. All three individuals were in low bushes on the lava flows and were solitary. They were noted from 3,000 to 4,000 feet.

The female taken on the 12th was still in winter plumage, while the one taken the 22nd had just commenced the prenuptial molt about the face and auriculars.

***Dendroica townsendi* (Townsend). TOWNSEND'S WARBLER.**

Sylvia townsendi "Nuttall" Townsend, Journ. Acad. Nat. Sci. Phila., 7, p. 191, 1837 near Fort Vancouver, Washington.

Specimens collected. Divisadero, 1 (September 27, 1925); Mt. Cacaguate, 4 (December 1 to 10, 1925); Los Esesmites, 2 (February 2, 28, 1927); San José del Sacare, 1 (March 16, 1927).

Status. Uncommon fall, winter, and spring visitant, principally to the higher parts of the oak-pine association of the Arid Upper Tropical Zone. Dates of arrival and departure are September 27 and March 16.

Remarks. Townsend's warbler is a decidedly uncommon species in El Salvador, which probably marks about the southern limit of the winter range. The winter distribution, locally, is practically confined to the oaks and pines of the interior mountains where conditions most closely parallel those prevailing in the breeding range.

Possibly twenty examples of *townsendi* were seen on Mt. Cacagatique during December, 1925. Most of these were with flocks of the very common black-throated green warbler. It is not likely that the species is more common than the few records indicate, for the vivid yellow breast and dark cheek patch are very noticeable in life, and such birds as consorted with *virens* were instantly noticeable on the characters mentioned. On Los Esesmites one or more *townsendi* were seen daily from February 2 to March 8, 1927. It was evident that this elevation (6,400 to 8,000 feet) was much more favored as a winter habitat than the 3,500 to 4,000 foot level on Mt. Cacagatique and San José del Sacare, for at least a hundred were noted there. Although favoring the pines of the south slope, the species was observed several times in the cloud forest. The taking of the single specimen at Divisadero, at an altitude of only 800 feet, was certainly an exceptional circumstance and represents an altitude far below the normal level.

***Dendroica virens virens* (Gmelin). BLACK-THROATED GREEN WARBLER.**

Motacilla virens Gmelin, Syst. Nat., 1, pt. 2, p. 985, 1789—Philadelphia, Pennsylvania.

Specimens and records. Rio Goascorán, 1 (October 29, 1925); Mt. Cacagatique, 5 (November 20 to December 21, 1925); Los Esesmites, 1 (February 9, 1927); San Salvador, 2 (February 22, 24, 1912); Volcán de Conchagua, 1 (March 3, 1926); Volcán de San Miguel, 1 (March 13, 1926). Also noted at San Salvador (February 27, 1912); La Palma (March 10, 1927); San José del Sacare (March 12, 1927); Volcán de San Miguel (March 24, 1926).

Status.—Common fall migrant and winter visitant and abundant spring migrant. Occurs principally in the lower mountains from about 3,500 to 5,000 feet, but detected at various elevations from 100 to 8,000 feet. Dates of arrival and departure are October 29 and March 24.

Remarks.—All through the mountainous districts, both in the interior and coastwise, the black-throated green warbler is an extremely common winter visitant; in fact, it constitutes, at levels

between 3,500 and 5,000 feet, fully 90 per cent of the nonresident warbler population. The numerous flocks of from a dozen to half a hundred individuals invariably formed the nuclei about which gathered smaller numbers of other insectivorous species resident and nonresident. The black-throated green warbler showed decided preference for the oak and pine association at the altitudes mentioned, although it was by no means confined to such environments. Many were seen in the coffee cover down to 3,000 feet on Mt. Cacaguatique and 2,300 feet at San Salvador. A few birds reach as high as 8,000 feet, at which level they were found in both pines and cloud forest on Los Esesmites. The single record at Rio Goascorán (100 feet) is of course that of a migratory straggler. The average winter range of *virens* lies approximately 3,000 feet below that of *townsendi*, although strays and vagrants make the extremes of altitude very nearly the same in both cases.

The northward migration begins early in March. On the 3rd of that month a very marked wave occurred on Volcán de Conchagua, a locality in which relatively few had been noted before that date. Similarly at La Palma on March 10 and at San José del Sacare on March 13 distinct temporary increases in numbers were observed.

***Dendroica occidentalis* (Townsend). HERMIT WARBLER.**

Sylvia occidentalis J. K. Townsend, Journ. Acad. Nat. Sci. Phila., 7, p. 190, 1837—Fort Vancouver, Washington.

Specimens collected.— Los Esesmites, 1 (February 21, 1927).

Status.—Apparently rare midwinter visitant to the pine association of the higher interior mountains.

Remarks.— The single specimen of the hermit warbler was taken in a grove of pines at 7,000 feet. It is not probable that hermit warblers occur in any great numbers at this extreme southern point, for a sharp lookout was kept for this as well as several other migratory species that might logically be found in the high, pines region.

***Dendroica fusca* (Müller). BLACKBURNIAN WARBLER.**

Motacilla fusca Müller, Natursyst. Suppl., p. 175, 1776, "Guyane" (= French Guiana).

Specimens and records.— Divisadero, 5 (September 23 to October 11, 1925); Rio Goascorán, 1 (October 29, 1925). Also noted at San Salvador (February 22, 1912).

Status.—Fairly common fall migrant and very rare winter visitant in the Arid Lower Tropical Zone. Not noted in spring.

Remarks. Many Blackburnian warblers were seen in the mimosa and other low growth about Divisadero between the dates listed above, and the species appears to be a common migrant through El Salvador in the early fall months. The last fall record is that of Rio Goascorán on October 29.

The only winter record is that of a highly plumaged male which was seen on February 22, 1912, in the shrubbery of a patio in the city of San Salvador. It is possible that this bird was an early spring migrant rather than a winter visitant.

***Dendroica dominica albilora* Ridgway. SYCAMORE WARBLER.**

Dendroica dominica var. *albilora* "Baird," Ridgway, Amer. Nat., 7, p. 606, October, 1873 Belize, British Honduras.

Specimens collected. San José del Sacare, 2 (March 13, 17, 1927).

Status. Spring migrant through the pine association of the cordillera.

Remarks. The two specimens collected at San José del Sacare were with mixed flocks of migrating warblers and vireos which were present in the pine groves during March, 1927. These were the only individuals noted at any time, and the species would appear to be rather rare in El Salvador.

***Dendroica graciae decora* Ridgway. DECORATED WARBLER.**

Dendroica graciae, var. *decora* Ridgway, Amer. Nat., 7, p. 608, October, 1873 - Belize, British Honduras.

Specimens and records.- San José del Sacare, 10 (March 12 to 18, 1927). Also noted on the lower slopes of Los Esesmiles (February 1 and March 10, 1927).

Status. Common in midwinter and spring (probably resident) in the pine-oak association of the Arid Upper Tropical Zone in the cordillera. The vertical range is from 3,500 to 4,000 feet.

Remarks. At San José del Sacare in the middle of March, 1927, decorated warblers were found in pairs and were evidently preparing to breed. The distribution seemed to be general all through the pines and oaks, with a pair to about every half mile of trail through favorable types of woodland. The males as a rule made themselves very conspicuous, and attracted the attention of the intruder by staying close by and singing at short intervals. The females usually slipped away at once, but after a short time would return and join the males.

This species was heard singing, and glimpses were obtained of several birds in the pines above La Palma on the lower slopes of Los

Esesmiles on February 1, and again on March 10, 1927. About 4,000 feet seemed to be their upper limit. Certainly none was present in the pines about the base camp at 6,400 feet on Los Esesmiles nor between there and the upper limits of the Arid Upper Tropical Zone at about 8,000 feet.

***Dendroica discolor discolor* (Vieillot). NORTHERN PRAIRIE WARBLER.**

Sylvia discolor Vieillot, Ois. Amér. 2, p. 37, pl. 98, Sept. 1807 [1809?]-Eastern United States and Greater Antilles (New York).

Specimens collected.— Volcán de San Miguel, 1 (March 15, 1926).

Status.— Rare spring migrant in the Arid Upper Tropical Zone.

Remarks.— The only specimen of this species, a male which had not yet commenced the prenuptial molt, was found in some bushes growing between two old lava flows at 3,000 feet. No others were noted, although considerable time was spent in searching for further evidence of occurrence. Probably this single bird represents a vagrant, for the chief winter home of the species is known to be the islands of the Caribbean. The stations nearest to the mainland at which it has been detected seem to be Cozumel Island off Yucatán, and Great Corn Island off the Atlantic coast of Nicaragua. The single El Salvador record does not, of course, indicate any extension of the normal winter range, but shows that the prairie warbler may be expected as a vagrant at almost any point on the Central American mainland.

***Seiurus aurocapillus* (Linnaeus). OVEN-BIRD.**

Molacilla aurocapilla Linnaeus, Syst. Nat., ed. 12, 1, p. 334, 1766—at sea apparently off Haiti.

Specimens and records.— Divisadero, 2 (November 3, 12, 1925); Mt. Cacaguatique, 2 (December 6, 15, 1925); Rio San Miguel, 1 (February 20, 1926); San Salvador, 2 (March 15, April 22, 1912); Volcán de San Miguel, 1 (March 20, 1926); Barra de Santiago, 1 (April 6, 1927); Lake Olomega, 1 (April 10, 1926). Also noted at Divisadero (October 17, 1925); Volcán de Conchagua (February 28, March 5, 1926).

Status.— Common in fall, winter, and spring in the foothills and lower mountains. Dates of arrival and departure are October 17 and April 10.

Remarks.— The oven-bird is by far the most common member of its genus wintering in El Salvador and in relative numbers exceeds

noveboracensis, the next most common form, by at least ten times. There is a decided difference in the habitats of the oven-bird on one hand and the three forms of water-thrushes on the other. The former occurs almost exclusively in dry leaf litter, while the latter are usually found in boggy tracts near water. This difference in the type of cover occupied naturally throws the center of abundance higher, speaking in terms of altitude, in the case of the oven-bird, which occurs from 200 to 3,500 feet, while *noveboracensis* ranges from sea level to 2,300 feet.

The habit of the oven-bird of rummaging, sparrow-like, among dead leaves is particularly exasperating when one has in mind some highly desirable sparrow and picks up the unwanted warbler. Like *noveboracensis* this species walks (not hops) when on the ground, but there the resemblance ends, for *aurocapillus* is chunkier in appearance and lacks much of the grace and daintiness of its relative. Both, however, are alike in being absolutely solitary. In no instance was either found in the company of its own or any other species.

Although much more common during the winter than the water thrushes, the oven-bird arrives decidedly later in the fall and also leaves earlier in the spring. Although one was seen unmistakably at Divisadero on October 17, no more were in evidence until November 3, after which date they became common. The water-thrush (*noveboracensis*) on the other hand arrived August 31 and became common immediately after that date. It is not too much to say that the bulk of the *aurocapillus* population arrives two full months behind that of *noveboracensis*.

***Seiurus noveboracensis noveboracensis* (Gmelin). NORTHERN WATER-THRUSH.**

Molacilla noveboracensis Gmelin, Syst. Nat., 1, pt. 2, p. 958, 1789 New York.

Specimens collected. Lake Olomega, 2 (August 31, September 5, 1925); Divisadero, 2 (September 27, 1925); Puerto del Triunfo, 1 (December 31, 1925); Barra de Santiago, 1 (March 31, 1927); San Salvador, 1 (April 12, 1912); Chilata, 1 (April 29, 1927).

Status.—Fairly common in fall, winter, and spring throughout the lowlands and foothills. Dates of arrival and departure are August 31 and April 29.

Remarks.—The first water-thrush to be detected during the fall migration was shot in the swamp forest at Lake Olomega on August 31, 1925. Soon after that date the species became fairly common and was noted almost daily in the marshy places in the forest. It was

also common at Divisadero during the latter part of September, all through October, and in late December, 1925. All through January, 1926, numerous individuals were seen in the forest at Puerto del Triunfo, as usual haunting the edges of bogs or streams. There was no obvious spring migration, since the birds, after the first week in April, simply became gradually less common, and the last specimen to be seen was taken April 29, 1927, at Chilata.

While in winter quarters water-thrushes seem always to be solitary. They were usually to be observed walking daintily about in wet or boggy places, such as swamp holes in the forest or at the water's edge along streams and ponds. The manner of walking, combined with the constant tail motion, is far more suggestive of the pipit (*Anthus*) than of the wood warblers. At Divisadero a few of these water-thrushes were usually to be found in a dry hillside field thickly grown with dead weeds—a most unusual location for a species which customarily haunts the vicinity of water.

***Seiurus noveboracensis notabilis* Ridgway. GRINNELL'S WATER-THRUSH.**

Siurus [sic] *naevius notabilis* Ridgway, Proc. U. S. Nat. Mus., 3, p. 12, March 27, 1880—Black Hills, Wyoming.

Specimens collected.—Divisadero, 1 (September 24, 1925).

Status.—This bird is a rare fall migrant through the Arid Lower Tropical Zone.

Remarks.—Compared with the preceding form, *notabilis* is extremely rare and was taken on but one occasion. The above-listed specimen is a bird of the year, of unknown sex, but it possesses the relatively large bill and nearly white underparts characteristic of the western race. It was shot in the shrubbery along the bank of a rocky stream which wound about through mimosa thickets.

***Seiurus motacilla* (Vieillot). LOUISIANA WATER-THRUSH.**

Turdus motacilla Vieillot, Ois. Amér. 2, p. 9, pl. 65, Sept. 1807 [1808?].—Kentucky.

Specimens collected.—Mt. Cacagatique, 1 (December 16, 1925).

Status.—Rare winter visitant to mountain streams at the upper limit of the Arid Lower Tropical Zone.

Remarks.—The Louisiana water-thrush is relatively a very rare species in El Salvador, for the sole date of record is December 16, 1925. On that occasion two of these birds (only one of which was taken) were found bobbing on the boulders projecting above a

shallow, rocky stream which flowed through the oaks and coffee groves on Mt. Cacaguatique. Both birds were so wild that it was only by accident that one of them was taken.

Oporornis formosa (Wilson). KENTUCKY WARBLER.

Sylvia formosa Wilson, Amer. Orn. 3, p. 85, pl. 25, fig. 3, 1811 Kentucky.

Specimens collected. Lake Olomega, 1 (September 1, 1925).

Status. Rare fall migrant through the lowlands.

Remarks. The Kentucky warbler is represented by only a single record. The specimen was taken in forest underbrush near the rocky shores of Lake Olomega.

Oporornis philadelphia (Wilson). MOURNING WARBLER.

Sylvia philadelphia Wilson, Amer. Orn. 2, p. 101. pl. 14, fig. 6, 1810 near Philadelphia, Pennsylvania.

Specimens collected. Divisadero, 5 (September 29, October 1, 3, 13, 16, 1925); Lake Chanmico, 1 (May 14, 1912).

Status.—Apparently a fairly common, but very local, fall migrant to the lower foothill region. Absent during the winter and detected on only one occasion in spring.

Remarks.—The mourning warbler was noted as fairly common about Divisadero from September 29 to October 16, 1925. At this date and place it was the only *Oporornis* present, for the much commoner *tolmiei* did not arrive in the country until six weeks later and then in a much higher zone. The single spring record is of a nonbreeding, one-year-old female which was taken in a brushy pasture at Lake Chanmico on May 14, 1912. During the fall migration mourning warblers were found in low shrubbery, principally along small watercourses.

Plumage notes. The postjuvenile molt of the four young of the year and the annual molt of the single adult from Divisadero had been completed before arrival, and all were in perfect fresh plumage. The one-year-old female taken at Lake Chanmico on May 14 had finished a very limited head-and-neck molt.

Oporornis tolmiei (Townsend). MACGILLIVRAY'S WARBLER.

Sylvia tolmiei J. K. Townsend, Narr. Journ. Rocky Mts., p. 343, April, 1839
—Columbia River, near Fort Vancouver, Washington.

Specimens collected.—Mt. Cacaguatique, 1 (December 4, 1925); Los Esesmites, 1 (February 4, 1927); San Salvador, 8 (February 28; March 12, 15; April 1, 12, 17, 22, 1912); Volcán de Conchagua, 1

(February 25, 1926); Volcán de San Miguel, 2 (March 18, 22, 1926); Hacienda Chilata, 1 (April 30, 1927); Volcán de Santa Ana, 1 (May 15, 1927).

Status.— Common midwinter visitant and spring migrant to the upper foothills and mountains, from 2,300 feet in the Arid Lower Tropical Zone to 8,000 feet in the Humid Upper Tropical. Dates of arrival and departure are December 4 and May 15.

Remarks.— Macgillivray's warblers did not arrive until much later than *O. philadelphia*, but after the first week of December they were to be found everywhere in underbrush in the higher foothills and mountains. On Mt. Cacaguatique they were noted in ravine growth along watercourses; on Volcán de Conchagua among the pines in company with black-throated green warblers; on Volcán de San Miguel in the head-high grass of the lava gullies; and on Los Esesmiles in clearings and in natural open spaces in the cloud forest. A fairly cool temperature rather than any particular plant association seems to be the primary factor governing their choice of winter quarters.

The bulk of the population moves north the latter part of April, but a few linger till as late as May 15. These very late birds may be nonbreeders. An adult male from Volcán de Santa Ana, May 15, was sexually completely dormant. It was in high spring plumage and exceedingly fat.

Plumage notes.— The fall molt is, of course, long finished by the time of arrival. In February and March there is a body molt, apparently much more extensive in the young than in adults. The former at this time take on the bluish head and chest of maturity. There is some individual variation, but in general it may be said that the extreme richness of coloration is not attained until the second year. The spring plumage of older birds is the result of a limited renewal plus the wearing away of the paler colored tips of the fall plumage. It takes place in February and March at the same time as that of the younger birds.

***Geothlypis trichas brachidactyla* (Swainson). NORTHERN
YELLOW-THROAT.**

Trichas brachidactylus Swainson, Anim. in Menag., p. 295, 1838—Northern Provinces of the United States.

Specimens and records.—Puerto del Triunfo, 1 (January 21, 1926); Los Esesmiles, 1 (February 12, 1927); Lake Ilopango, 1 (March 18, 1912); Lake Olomega, 2 (April 6, 8, 1926); San Salvador, 3 (April 9

to 17, 1926); Lake Chanmico, 3 (May 14, 17, 1912). Also noted at Puerto del Triunfo from January 1 to 27, 1926.

Status. Common midwinter visitant and spring migrant to all suitable localities from sea level to 8,000 feet. Dates of arrival and departure are January 1 and May 17.

Remarks. The northern yellow-throat was not detected in the fall, even in localities where later in the year it was present in numbers. It is safe to say that few, if any, reach El Salvador before about January 1, after which date the species is common and generally distributed in marshland, shrubbery along streams, and even in the fern bracken up to 8,000 feet in the Arid Upper Tropical Zone.

The northward migration is chiefly during early April. At Lake Olomega from April 1 to 8, 1926, and at San Salvador until April 17, 1912, yellow-throats were very common, much more so than during the winter. However, some individuals remain very late in spring; indeed, locally, they are sometimes actually common in the middle of May. An instance of this is the fact that at Lake Chanmico from May 13 to 17, 1912, *brachidactyla* was frequently noted in the grass and mimosa scrub about the edge of the lake. A peculiarity of this occurrence was that the birds were usually in pairs. The two males taken were in breeding condition, and the single female had rapidly developing ova. The assumption was, at the time, that a breeding form was present, and only on direct comparison later was it determined that these birds were only belated migrants.

Plumage notes. Two young males, taken April 6 and 9, respectively, are in the first spring (first prenuptial) molt.

***Chamaethlypis poliocephala caninucha* (Ridgway). CENTRAL AMERICAN YELLOW-THROAT.**

Geothlypis poliocephala, var. *caninucha* Ridgway, Amer. Journ. Sci., 4, p. 459, December, 1872 Retalhuleu, Guatemala

Chamaethlypis poliocephala caninucha Miller, Condor, 34, p. 16, January, 1932 -Sonsonate (nesting).

Specimens collected. Lake Chanmico, 3; Volcán de Santa Ana, 2; Volcán de San Miguel, 1; San Salvador, 1; Volcán de Conchagua, 1; Puerto del Triunfo, 1; Sonsonate, 3; Los Esesmiles, 2; Divisadero, 1; Lake Guija, 1.

Status.—Uncommon but generally distributed resident in grasslands and fern brakes from sea level to 8,000 feet.

Remarks.—In several of the specimens there are traces of a greenish or yellowish mark on the lower eyelid. The occasional

presence of this character of course effectually disposes of any attempt to retain *caninucha* as a specific name. Griscom¹ has recently reached the same conclusion as ourselves.

Measurements of the El Salvador series of *caninucha* are as follows:

	Wing	Tail
10 males	57-60	57-64
5 females	52-55	55-62

The association to which this yellow-throat is confined almost exclusively is the bunch grass (*Panicum*, *Paspalum*, and others) which grows locally in open ground from sea level to at least 6,500 feet. Above that level, on Los Esesmites, the fern bracken provide acceptable cover. Occasional individuals may be noted in mimosa thickets, weed-grown fields, and similar places, but the natural environment, and the one in which the species is normally found is tall, stiff grass. Naturally the plumage becomes fearfully abraded under such circumstances, and by spring the tail feathers are often worn off to such an extent that measurements are worthless. In the above table only relatively unworn specimens are listed.

While the prepared skins of this species somewhat resemble chats (*Icteria*) in miniature, the vernacular name "ground-chat" is so patently incongruous to anyone who has ever met the live bird that there would seem to be no object in perpetuating it. In life it is a typical yellow-throat, even to the alarm note. It is always active and has quick, jerky motions as it slips about through grass stems and weed tangles.

Nesting.--By dissection of specimens it is apparent that the breeding season begins in late March and that it extends to the middle of July. Miller (sup. cit.) found three nests at Sonsonate on July 13, 16, and 21, 1925, which contained 3, 3, and 4 eggs, respectively. All these nests were "composed of the blades of flat sedges" and were placed about a foot and a half above the ground in clumps of grass. The eggs are described as "very similar to those of *Geothlypis*."

Plumage notes.--Although the sexes have generally been considered alike, they are sufficiently distinct to be distinguished even before dissection. In the females the gray is frequently confined to the pileum and is paler and less pure in color; the lores and subocular area are not pure black as in the males, but are dull, blackish brown or blackish slate. In the juvenal females (juvenal males not available)

¹ Proc. New Eng. Zool. Club, 12, p. 8, April, 1930.

the whole pileum and loreal region are olive-green, concolor with the back. At the postjuvenile molt they become practically indistinguishable from the adults. February and March birds show a spring (prenuptial) molt about the head, similar to but less extensive than in *Geothlypis trichas*.

Colors of soft parts. Adults, sexes alike: iris, dark brown; maxilla, blackish plumbeous, tomia paler; mandible, flesh color; tarsi and feet, brownish flesh-color.

Stomach contents.—Small insects exclusively, 2.

***Icteria virens virens* (Linnaeus). YELLOW-BREASTED CHAT.**

Turdus virens Linnaeus, Syst. Nat., ed. 10, 1, p. 171, 1758 South Carolina, 200 or 300 miles from the sea.

Specimens collected. Divisadero, 2 (October 10, 16, 1925); Puerto del Triunfo, 2 (January 5, 22, 1926); Barra de Santiago, 2 (April 10, 12, 1927); Lake Olomega, 1 (April 12, 1926).

Status.—Uncommon fall migrant and winter visitant and fairly common spring migrant in the lowlands. Noted only from sea level to 800 feet. Dates of arrival and departure are October 10 and April 12.

Remarks.—Yellow-breasted chats were by no means common during the fall and winter. None was seen during the fall migration other than the two taken at Divisadero, while in midwinter at Puerto del Triunfo not more than about a dozen were detected during the month of January. At both Barra de Santiago and Lake Olomega chats were migrating in fair numbers on the dates given above. Occasional individuals were noted at each place from April 1 up to the time of the definite increases, but these may have been either winter birds which had not yet started to drift northward or else the advance guards of the migration.

During the winter not a single note was heard which could be definitely placed as "chat," and so far as could be determined, the species is silent at that time. The usual types of cover inhabited were the coyol-palm undergrowth and thick shrubbery bordering streams and clearings.

***Wilsonia citrina* (Boddaert). HOODED WARBLER.**

Muscicapa citrina Boddaert, Table Pl. Enl., p. 41, 1788—Louisiana.

Specimens collected.—Mt. Cacaguatique, 1 (December 12, 1925); Volcán de Conchagua, 1 (March 3, 1926).

Status.—Rare winter visitant to the foothills.

Remarks. The two specimens of the hooded warbler recorded, previously, were the only examples of this warbler to be noted. It is obviously very rare in Central America, for Carriker¹ gives but two records for Costa Rica.

Both of the El Salvador specimens were taken at an altitude of 3,500 feet. The specimen from Mt. Cacaguatique, a female of the year, was in a vine tangle at the edge of the oaks, while the adult male taken on Conchagua was in a similar situation at the edge of a coffee grove.

Wilsonia pusilla pileolata (Pallas). NORTHERN PILEOLATED WARBLER.

Motacilla pileolata Pallas, Zoogr. Rosso-Asiatica, 1, p. 497, 1811—Kodiak Island, Alaska.

Specimens and records.—Monte Mayor, 1 (October 6, 1925); Mt. Cacaguatique, 6 (November 22 to December 20, 1925); Los Esesmiles, 3 (February 4 to 22, 1927); Volcán de Conchagua, 1 (March 4, 1926). Also noted at San Salvador (February 28, 1912).

Status.—Fairly common in fall, winter, and spring in the foothills and mountains throughout the republic. The dates of arrival and departure are October 6 and March 4.

Remarks.—The northern pileolated warbler was found to be a rather common winter visitor between the elevations of 3,500 and 8,500 feet. Below the former altitude but two specimens were taken, one at 1,000 feet at Monte Mayor and one at 2,300 feet at San Salvador. The whereabouts of the San Salvador specimen is not known, and its allocation as the present form is, therefore, tentative. While it is possible that one or two of the above birds are of the eastern race *pusilla*, there are none which are unquestionably so, and we, therefore, consider all of them to be *pileolata*.

In its winter home this warbler is chiefly an inhabitant of low growth beneath the forest. Coffee groves are particularly favored in the lower elevations. On Los Esesmiles many were noted in the cloud forest, but there were even more in the arid associations such as oak scrub, bracken beneath the pines, and blackberry tangles along small watercourses.

Although Carriker² says that *pileolata* occurs down to sea level in Costa Rica, it would be very exceptional for this bird to do so

¹ Ann. Carnegie Mus., 6, p. 803, 1910.

² Ann. Carnegie Mus., 6, p. 802, 1910.

in El Salvador. At no time was it found in the hot lowlands and, as previously mentioned, only rarely as low as 1,000 feet.

***Wilsonia canadensis* (Linnaeus). CANADA WARBLER.**

Muscicapa canadensis Linnaeus, Syst. Nat., ed 12, 1, p. 327, 1766 Canada.

Specimens collected. Lake Olomega, 3 (September 1 to 5, 1925); Divisadero, 1 (September 30, 1925); Monte Mayor, 1 (October 7, 1925).

Status. Detected only as an uncommon fall migrant through the lowlands.

Remarks. Besides the specimens taken several more were seen at Lake Olomega on September 5, one at Divisadero on September 30, and several at Monte Mayor on October 7.

The Canada warbler is by no means a common species in El Salvador, even during the height of the migration. All those that were noted were either in forest undergrowth or in the lower levels of foliage. Not one individual was detected during the spring migrations—a circumstance which indicates that El Salvador is somewhat off the main migration route of this species.

***Setophaga ruticilla* (Linnaeus). AMERICAN REDSTART.**

Motacilla ruticilla Linnaeus, Syst. Nat., ed. 10, 1, p. 368, 1758—Virginia.

Setophaga ruticilla Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 178, October, 1881—Acajutla; Cooke, Bull. U. S. Dept. Agric., Div., Biol. Surv. 18, p. 132, 1901 Salvador.

Specimens and records. Lake Olomega, 1 (August 27, 1925); Divisadero, 1 (October 3, 1925); Puerto del Triunfo, 2 (December 31, 1925; January 4, 1926); Barra de Santiago, 3 (April 1 to 8, 1927). Recorded from Acajutla (March, 1863).

Status. Common spring and fall migrant and winter visitant to the coastal plain. Extreme dates of arrival and departure are August 27 and April 8.

Remarks. Although but few specimens were taken, the redstart is, nevertheless, decidedly common everywhere in the lowland forests in fall, winter, and spring. There was no sudden arrival of numbers of redstarts, but the species gradually became more and more common after the first arrivals had been noted. In the spring, however, the northward movement was in waves. At Barra de Santiago there were marked flights on April 7 and 8, after which dates none was seen.

In winter quarters redstarts are solitary so far as association with their own kind is concerned. However, it is usual to find them consorting with other visiting warblers such as the black-throated green and Tennessee.

The authors of the *Biologia Centralia-Americana* list a specimen from Acajutla as taken by "O. S." In this case the date is most likely in March, 1863, when Salvin was a passenger on Captain Dow's steamer *Guatemala*.

***Setophaga picta guatemalae* Sharpe. GUATEMALAN PAINTED REDSTART.**

[*Setophaga picta*] subsp. *Setophaga guatemalae* Sharpe, Cat. Birds Brit. Mus., 10, p. 417, 1885—Guatemala.

Specimens and records.—Mt. Cacaguatique, 7 (November 20 to December 16, 1925); San José del Sacare, 5 (March 12 to 18, 1927). Also noted above La Palma (March 10, 1927).

Status.—Common resident of the oak-pine association of the Arid Upper Tropical Zone in the interior mountains. The extremes of elevation at which this species was found were 3,500 and 5,000 feet.

Remarks.—The characters on which this form was based hold very well in the foregoing series. The white on the tertials and third pair of rectrices is reduced to a minimum or is lacking altogether, even in fresh-plumaged skins. The red of the underparts also averages slightly deeper and richer than is the case with extreme northern (Arizona) specimens of typical *picta*.

The Guatemalan painted redstart is permanently resident throughout the oak-pine region of the cordillera. It is rigidly confined to the one environment, and not even at Mt. Cacaguatique, where extensive interdigitation of Arid Lower Tropical and Arid Upper Tropical associations occurs, was it ever found in any type of cover other than oaks and pines. The upward limit is fixed by temperature apparently, for although the species was numerous about San José del Sacare and up to 5,000 feet above La Palma, it was not observed above that altitude. The base camp on Los Esesmiles was at 6,400 feet, but not a single painted redstart was found there, although as above noted they were common below 5,000 feet on the same mountain. The same species of pines and oaks extend from 3,500 feet up to 8,000, and one would expect the redstarts to have a corresponding distribution. Such, however, is not the case.

This species is active ceaselessly and seldom remains quiet even for a moment. One of its most characteristic traits is to work

nuthatch-like over rough-barked oaks and pines with quick, nervous fanning of the wings and tail. If there is any difference in habits between the southern and northern forms, it lies in the fact that the southern habitually works higher above the ground. Possibly thirty feet would be average. The Arizona race is essentially an inhabitant of fern-grown ravines and undergrowth. During the winter *guatemalae* frequently attaches itself temporarily to flocks of other small birds as they hunt through the treetops.

Nesting. Specimens taken during the latter part of March at San José del Sacare were obviously breeding.

Colors of soft parts. Adults: iris, dark brown; bill, tarsi, and feet, black.

***Myioborus miniatus hellmayri* van Rossem. PACIFIC ORANGE-BELLIED REDSTART**

Myioborus miniatus hellmayri van Rossem, Condor, 38, No. 3, p. 117, June, 1936- Volcán de Santa Ana, El Salvador.

Specimens collected. - Volcán de Santa Ana, 3 (May 8 to 14, 1927).

Status.--Uncommon summer visitant (probably a permanent resident) in the Humid Upper Tropical Zone on Volcán de Santa Ana.

Remarks.--Specimens from Volcán de Santa Ana appear to be identical with a series of *hellmayri* from the Pacific cordillera in western Guatemala. Measurements of the adult males are 66-67 for the wing and 69-71 for the tail, and the color of the underparts is bright reddish-orange, just the color of a tangerine orange.

This subspecies was nowhere nearly so common in the cloud forest on Santa Ana as was *connectens* on Los Esesmites. In addition to the two adult males collected, not more than half a dozen individuals were seen, and the greater part of these were juveniles.

Nesting. A single youngster just out of the nest was taken May 14, and a nest containing three newly-hatched young was found on May 17. This nest was in a crevice in a vertical road bank, the site being about three feet above the road level. It was simply a ball of bright green moss which entirely filled the cavity, and the outer surface of the nest was flush with the face of the bank. The entrance was a small hole in the side. The lining was of rather wide strips of what appeared to be soft inner bark. A sheltering curtain of ferns hung down over the nest entrance, and the site was discovered only by watching the parents as they carried food to the young.

Plumage notes. The juvenal female collected May 14 is uniform "dark neutral gray" above, fading to "deep neutral gray" on chin and throat; chest and sides brownish "fuscous," lightening to "saya brown" on the abdomen. The remiges and rectrices are similar to those of the adults.

Colors of soft parts. Adults: iris, tarsi, and feet, dark brown; bill, black. Juvenile: iris and bill, dark brown; tarsi and feet flesh color.

***Myioborus miniatus connectens* Dickey and van Rossem.**
HONDURAS ORANGE-BELLIED REDSTART.

Myioborus minialus connectens Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 189, October 15, 1928—Los Esesmls, Chalatenango, El Salvador.

Specimens collected.— Los Esesmls, 12 (February 13 to March 5, 1927).

Status.— Common in February and early March (presumably resident) in the cloud forest of the Humid Upper Tropical Zone on Los Esesmls, straggling a short distance into the upper parts of the Arid Upper Tropical.

Remarks.— The race *connectens* is very similar in coloration to *hellmayri* but is consistently smaller in size. The wings of the adult males measure from 62 to 64 millimeters and the tails from 63 to 64. As is now well known, this is a race which centers in the mountains of south-central Honduras and which enters El Salvador along the boundary between the two countries.

The home of this species is the cloud forest of the Humid Upper Tropical Zone and there, both on Los Esesmls and Volcán de Santa Ana (pl. 27) it was found principally in the undergrowth. Compared with its relative (*Setophaga picta*) of the oak and pine regions it is far less active. It is also less conspicuous, not alone because of the absence of the vivid, white, wing bars of *picta*, but because it habitually keeps to low, thick cover and does not work on tree trunks and in open foliage.

At no point were the ranges of the orange-bellied and painted redstarts found to overlap, or indeed even to approach one another. The highest point at which the painted redstart was found was 5,000 feet, whereas the lowest elevation for the orange-bellied redstart on the same mountain (Los Esesmls) was 6,500 feet, and then only as a straggler. On Volcán de Santa Ana where the cloud forest descends to about 4,500 feet and where orange-bellied redstarts were found as

low as 5,500 feet, painted redstarts do not occur at all. The local distribution of the two resident species of redstarts presents a striking contrast to their behavior in Guatemala where, according to Griscom,¹ *Myioborus* occurs at low altitudes and sometimes ranges "up to the lowest levels of the painted redstart so that the two birds are occasionally found in the same wood."

Colors of soft parts. As in *hellmayri*.

Euthlypis lachrymosa Cabanis. FAN-TAILED WARBLER.

Euthlypis lachrymosa Cabanis, Mus. Hein., 1, p. 19, footnote, 1850—Lagunas, (Oaxaca) Mexico; van Rossem, Bull. Mus. Comp. Zool., 77, No. 7, p. 474, Dec., 1934—in text, El Salvador (crit.).

Euthlypis lachrymosa schistacea Dickey and van Rossem, Condor, 28, p. 270, 1926—Volcán de Conchagua, Dept. La Unión, El Salvador; van Rossem, Trans. San Diego Soc. Nat. Hist., 6, No. 19, p. 286, in text, 1931—El Salvador.

Specimens collected.—Lake Olomega, 11; Colinas de Jucuarán, 5; Volcán de Sociedad, 4; Volcán de San Miguel, 2; Mt. Cacaguatique, 7; Volcán de Conchagua, 4; Lake Guija, 1; Chilata, 3.

Status.—Fairly common resident of the foothills and mountains in the Arid Lower Tropical Zone. Although found from elevations varying from 200 to 3,500 feet, the species is relatively rare below 500 feet.

Remarks.—Now that the individual variations of this warbler are better known, it is evident that no consistent geographic variation can be recognized.

"Rock warbler" would be a name fully as appropriate as fan-tailed warbler, for throughout its El Salvador range this species is an inhabitant of rocky ravines and jungle-covered lava flows. In addition there appear to be other requirements such as thin undergrowth beneath tall forest so that, although the species has a wide range, the distribution is necessarily spotty in character.

The general appearance of this warbler is very similar to that of a redstart—a resemblance due in no small measure to the continual nervous fanning of the tail. Living as these birds do in heavily shaded situations among dark rocks, they would be nearly invisible were it not for this curious habit. In life the brightly colored underparts are not often noticeable, and the tail movement, in which the white terminal spots are alternately flashed out and concealed, is the most betraying character. When this bird works over rocks and

¹ Bull. Amer. Mus. Nat. Hist., 64, p. 341, 1932.

through leaf litter, it has, except for the tail movements, no jerky motions. The birds steal about quickly, taking full advantage of all cover. They do not hop like thrushes and most sparrows, but walk after the manner of larks and the North American oven-birds.

Rocks being their preference these warblers, are never found on the flat portions of the coastal plain, although they descend to very low levels where there are old lava flows. The deep, gloomy ravines so numerous on the Colinas de Jucuarán and Volcán de Conchagua, provide an ideal environment, and fan-tailed warblers are perhaps more common in these two localities than in any others.

Nesting.—Specimens taken at Chilata in late April, 1927, were apparently ready to breed. This was not the case with those taken on Volcán de Conchagua in early March, nor on Volcán de San Miguel in late March of the same year. Bob-tailed juveniles, lately from the nest, were taken in the Colinas de Jucuarán near Lake Olomega August 7, 1925. Full-plumaged postjuveniles were also taken on this date. These probably represent the first broods of the season and the juveniles the second.

Plumage notes. The juveniles (sexes alike) are not described in Ridgway's *Birds of North and Middle America*, and therefore a short description is given here. Upperparts, including sides of head and wing coverts, uniform "dark neutral gray"; chin, throat, and chest, "hair brown" or "fuscous"; flanks similar but more sooty; median underparts, including under tail coverts, pale "primrose yellow," mingling with the color of the chest in the form of broad streaking or mottling; wings and tail essentially as in adult, but rectrices more pointed.

The postjuvinal body plumage is apparently identical with that of the adult. The juvinal remiges and rectrices are retained through the following breeding season. There is no evidence of more than one molt a year.

Colors of soft parts.—Adults: iris, tarsi, and feet, dark brown; bill, black. Juveniles: iris, dark brown; bill, brownish black; tarsi and feet, flesh color. The tarsi and feet become dark by midwinter.

Stomach contents.—Insects exclusively, 10.

***Basileuterus belli scitulus* Nelson. GUATEMALA WARBLER.**

Basileuterus belli scitulus Nelson, Auk, 17, p. 268, July, 1900—Todos Santos, Guatemala.

Specimens collected.—Los Esesmiles, 4 (February 19 to March 5, 1927).

Status. Uncommon in late winter and early spring in the undergrowth of the cloud forest on Los Esesmlles, where it is probably a permanent resident (fig. 25).

Remarks. The detection of this species on Los Esesmlles extends the known range of *scitulus* some 200 miles to the southwest. The examples taken are unmistakably of the Guatemalan race and possess the characteristic larger size and darker coloration. 'Todd' is correct in stating that the underparts are less yellow and more heavily shaded with green than in *belli*. However, wear is a factor to be considered, for the green mottling on the central underparts is confined largely to the tips of the feathers and is to some extent lost through abrasion.

Very few of these birds were met with, and these were all noted in the densest parts of the cloud-forest undergrowth at about 8,000 feet. They were very active and would remain in sight only for an instant at a time. Undergrowth in which tree ferns predominated seemed to be favored.

Colors of soft parts. Adults: iris, dark brown; bill, black; tarsi and feet, brownish flesh-color.

***Basileuterus delatirii delatirii* Bonaparte. DELATRIE'S
WARBLER.**

Basileuterus delatirii Bonaparte, Compt. Rend., 38, p. 383, 1854 Nicaragua.

Specimens collected. Lake Olomega, 6; Volcán de Conchagua, 1; Divisadero, 4; Volcán de San Miguel, 4; Monte Mayor, 1; Lake Ilopango, 1; San Salvador, 6; Volcán de Santa Ana, 1; Chilata, 4.

Status. Common resident of woodlands and undergrowth throughout the foothills and lower mountains in the southern and eastern departments. Detected from 200 to 5,000 feet (fig. 25).

Remarks. The foregoing series is very uniform in a geographical sense, there being no apparent difference between extreme eastern and extreme western series. Individually there is decided variation in relative proportions of wing and tail and to some extent in color.

Todd,² the latest reviser of the genus, removes the *rufifrons* group from the genus *Basileuterus* on account of the relative proportions of wing and tail, narrower rectrices, and relatively shorter bill. The present series of twenty-eight *delatirii* contains ten specimens in which the tail is longer than the wing, thus eliminating one of the

¹ Proc. U. S. Nat. Mus., 74, p. 84, 1929.

² Proc. U. S. Nat. Mus., 74, art. 7, 1929.

characters supposed to distinguish *Idiotes* from *Basileuterus*. In the text (p. 88) Todd considers that *rufifrons* may always be distinguished from *delatirii* (aside from the supposed generic characters given) by its less uniformly yellow underparts, presence of a white streak below the auriculars, and often by a paler median crown streak which *delatirii* is supposed never to possess. It is significant that several of the El Salvador birds have distinct traces of a white streak below the auriculars and two of them (Nos. 8,100 and 16,066) have very noticeable median crown streaks. All things considered, it is difficult to see how *rufifrons* and *delatirii* can be kept apart specifically, much

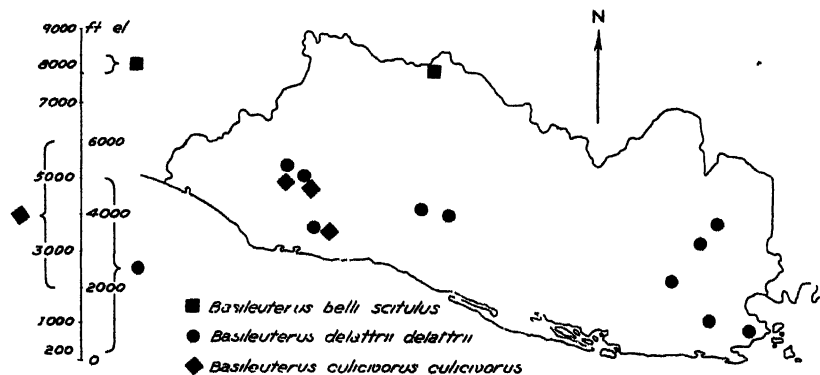


FIG. 25. Distribution of the wood warblers of the genus *Basileuterus*, in El Salvador.

less generically, but for the present we follow Todd and employ *delatirii* rather than *rufifrons* as the specific name for the race in El Salvador.

Delattre's warbler is by far the commonest and most generally distributed resident member of the *Compsothlypidae*. Its habitat is undergrowth, preferably in damp places, and in general there is a marked resemblance to *Wilsonia* in habits and actions. It is most common in the foothill region, haunting the shrubbery along the borders of streams and lakes, but above 3,000 feet there is a marked diminution of numbers. On Volcán de Conchagua only one pair was noted in the thin underbrush beneath the oaks as high as 4,000 feet. The extreme elevation reached is the lower edge of the Humid Upper Tropical Zone where, on Volcán de Santa Ana, a single bird, apparently breeding, was found in the cloud forest at 5,000 feet. None was found along the seacoast at any season.

The local distribution is peculiar, for, although *delatirii* is a very common bird throughout the hill region of the Oriente and clear

across the country southerly, it seems to be entirely absent in the central and northern interior. There seems to be absolutely no reason why the species should not be present in the upper Lempa Valley and about Lake Guija, but it is absent over this whole region.

Nesting. Dissection of specimens showed that breeding commences about the middle of the month of March and continues through the summer.

Plumage notes. The molts of this species appear to follow the sequence normal to the wood warblers in general. The juvenal remiges and rectrices do duty until the first annual (first post-nuptial) molt. There is no discernible difference between the body plumages of first-winter and adult specimens. The spring molt is so limited in nature that in many specimens it is no more than a few scattered feathers about the head and back certainly nothing like the heavy spring molts of some migratory genera, such as *Dendroica*.

Colors of soft parts. Adults: bill, black; tarsi and feet, dark, brownish flesh-color to brownish plumbeous; iris, dark brown. First fall: similar but tarsi and feet, flesh color to brownish flesh-color.

Stomach contents. Small insects exclusively, 4.

***Basileuterus culicivorus culicivorus* (Lichtenstein). LICHTENSTEIN'S WARBLER.**

Sylvia culicivora Lichtenstein, Preis-Verz. Vog., Mex., p. 2, no. 78, 1830 "Mexico" (Jalapa, Vera Cruz, designated by Todd, 1929).

Specimens and records. Chilata, 3 (April 23, 25, 1927); Volcán de Santa Ana (Cerro Los Naranjos), 6. Also noted on the main cone of Volcán de Santa Ana.

Status. Fairly common in spring and summer in the coffee groves along the crest of the Balsam Range and both in coffee and natural undergrowth on Volcán de Santa Ana. The vertical range is from 2,000 to 6,000 feet and therefore from the higher parts of the Arid Lower Tropical well into the Humid Upper Tropical Zone (fig. 25.)

Remarks.— Four of the nine specimens have yellow median crown patches; the other five show various degrees of ochraceous orange. Todd has noted that the yellow-crowned type predominates in the northern parts of the range and that the orange-crowned type is far more common in the south. Sex plays no part in this variation, for both males and females are represented in each phase.

These warblers were first detected at Chilata when a small flock of four or five was found working through a grove of coffee in company with several Delattre's warblers and a pair of *Hylophilus decurtatus pallidus*. Occasional small flocks, pairs, or single birds were seen subsequently in similar locations at Chilata during the last days of April, 1927. Generally they were associated with Delattre's warblers, but their rapid movement through the foliage, combined with their dull coloration, made the taking of specimens a matter of chance. Later in the season, in May, 1927, they were found to be fairly common in the coffee groves and other undergrowth on Volcán de Santa Ana. By this latter date they were in pairs and stayed pretty closely to limited areas. Their actions at this time presupposed nests, but none of the females taken had laid as yet. Were it not for the rapid, castanet-like notes, which are given continuously when there is the slightest cause for alarm, this species would be very easily overlooked.

Colors of soft parts.—Iris and bill, dark brown; tarsi and feet, brownish flesh-color.

Family ICTERIDAE. Meadowlarks, Blackbirds, and Orioles

***Agelaius phoeniceus grinnelli* Howell. SALVADOR RED-WINGED BLACKBIRD. CORDELIÁN.**

Agelaius phoeniceus grinnelli A. B. Howell, Auk, 34, p. 196, 1917—San Sebastián, Dept. La Paz, Salvador; van Rossem, Condor, 32, p. 162, 1930—El Salvador (crit.); Miller, Condor, 34, p. 16, January, 1932—Lake Olomega (nesting).

Specimens and records.—Lake Olomega, 26 (July 29 to September 9, 1925; February 7 to April 11, 1926); San Sebastián, 5 (July 18 to 22, 1912). Recorded from San Sebastián; Lake Olomega.

Status.—Common resident of fresh-water marshes from the vicinity of the mouth of the Lempa River east to Lake Olomega.

Remarks.—The series collected since *grinnelli* was described permits a better definition of the form than was previously possible. Compared with *Agelaius phoeniceus sonoriensis*, the El Salvador race has decidedly longer and heavier tarsi and feet; the bill, while about the length of that of *sonoriensis*, is heavier at the base, and the outline of the culmen is usually convex rather than concave. In color the females are very similar to *sonoriensis* ventrally, but the upper-parts are decidedly darker and browner. The males have remarkably long and prominent lesser wing coverts which give, in fresh plumage,

a red shoulder patch of about 45 millimeters in length. Below are given the average size differences between fully adult males of the two races.

	Wing	Tail	Culmen from base	Tarsus	Middle Toe minus claw
45 <i>sonoriensis</i>	125.4	92.8	24.8	29.5	21.9
8 <i>grinnelli</i>	123.6	92.6	25.4	31	23.2

Lake Olomega and San Sebastián were the only localities in which red-winged blackbirds were found. There is a large tule marsh at Zapotitán, but neither in 1912 nor in 1927 were any of these birds found there. Therefore, in the absence of other suitable marshes, it appears certain that red-wings are confined to the lowlands from the vicinity of the mouth of the Lempa east to Lake Olomega. At San Sebastián very few red-wings were present; in fact, only five specimens were taken in two weeks' collecting. Lake Olomega, where the species was found to be common throughout the year, is very obviously the center of abundance and possibly the location of the only permanent colony of red-winged blackbirds in the republic.

In general habits *grinnelli* is a counterpart of its more northern relatives. In the fall and winter small flocks, in which both sexes were present, were found all through the marsh and the nearby corn-fields. By early April there was a pronounced sex segregation, for practically the entire male population had picked out and mounted guard over the future nesting sites in the marsh, while the females were still in roving flocks.

Nesting. In July, 1912, all specimens collected were in breeding condition and a pair was found nest-building on the 22nd. Several nests containing three eggs each, which were found at Lake Olomega on July 29, 1925, were very probably second layings, for young on the wing were common everywhere at that date. The nests were placed a few feet above the water in thorny mimosa bushes which grew commonly in the shallows along the north shore. In construction they were deeper and more firmly built than those of northern birds. The material was that which is usually employed by red-wings everywhere—strips of rushes, flat blades of grass, and pliable weed stems.

Plumage notes.—The sequence of molts and the time of their inception appears to be very similar to that of the more northern races. Young of the year and adults were starting the postjuvenile and annual molts in early September, and the limited spring molt had been completed only recently in specimens taken in late March and early April.

***Agelaius phoeniceus nayaritensis* Dickey and van Rossem.**
NAYARIT RED-WINGED BLACKBIRD.

Agelaius phoeniceus nayaritensis [typog. err.] Dickey and van Rossem, Proc. Biol. Soc. Wash., 38, p. 131, November 13, 1925 Santiago, Nayarit, Mexico.

Specimen collected.— Lake Olomega, 1 (April 6, 1927).

Status. Rare spring migrant on the coastal plain.

Remarks. Recent examination of a small series of breeding red-wings in Dr. Jonathan Dwight's collection from Antigua and San Antonio, Guatemala, indicates that the large form of west-central Mexico extends south to these points. However, decision as to whether these Guatemala birds are in fact *nayaritensis* must await more extensive material. They are definitely not *grinnelli*, for they are entirely too large. Measurement of the vagrant male from El Salvador is as follows: wing, 130; tail, 98; culmen from base, 26.7; depth at base, 13.4; tarsus, 33.3; middle toe minus claw, 24.

Red-winged blackbirds do not breed nor do they apparently occur at any season on any of the mountain lakes of El Salvador, hence there can be no intergradation between *grinnelli* of the coastal plain and the Guatemala highland race. The two races are separated by 200 miles in distance and occupy different life zones.

The specimen taken at Lake Olomega appeared in life to be very much larger than the *grinnelli* with which it was associated. The testes were dormant, while the resident *grinnelli* was preparing to breed. It would be interesting to determine whether the colony of red-winged blackbirds which breed on the mountain lakes of Guatemala are resident there, or whether they are entirely migratory during the colder months.

***Icterus pectoralis pectoralis* (Wagler). SPOTTED-BREASTED**
ORIOLE. (MILTOTA (orioles in general).

Psalrocolitus pectoralis Wagler, Isis, p. 755, 1829 Mexico.

Icterus pectoralis Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 474, 1887 part, Acapulco.

Icterus pectoralis pectoralis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 2, p. 283, 1902— Acapulco.

Icterus pectoralis anthonyi Griscom, Amer. Mus. Novit., 438, p. 18, December 15, 1930—part, Salvador (crit.).

Icterus mentalis Lafresnaye (not of Lesson), Rev. Zool., 5, p. 136, May, 1842 --"San Carlos" (La Unión).

Specimens and records.—Lake Olomega, 6; Rio San Miguel, 5; Lake Chanmico, 1; Puerto del Triunfo, 1; Lake Guija, 3; San Salvador, 2; Zapotitán, 1; Barra de Santiago, 1; Sonsonate, 1. Also noted at Rio Goascorán; Volcán de San Salvador; Miraflores. Recorded from Acajutla; "San Carlos" [La Unión].

Status.—Fairly common resident of the Arid Lower Tropical Zone, principally below 2,300 feet. The center of abundance is the mimosa association of the foothill region coastwise. Locally, as on Volcán de San Salvador, a few individual birds may be found up to 4,500 feet.

Remarks.—El Salvador examples of this species belong to the northern race although they show a little tendency to approach, in their smaller average size, *Icterus pectoralis espinachi* Ridgway of Costa Rica and southern Nicaragua. We cannot see our way to recognizing *I. p. anthonyi* as a bird of El Salvador. Our El Salvador males, all from the Arid Lower Tropical Zone, range in wing measurement from 100 to 111 mm., the size extremes thus overlapping into both *espinachi* and *pectoralis*.

There can be no doubt that the "*Icterus mentalis* Lesson," mentioned by Lafresnaye belongs here. "Les individus rapportés de San Carlos diffèrent de l'espèce type par un orangé tirant au rouge sur la tête, les côtés du cou et le ventre. Le noir est profond et lustré. Le thorax est couvert de gouttes noirs. Un seul miroir blanc imparfait occupe le milieu de l'aile. Les épaules sont jaunes d'or."

The local range of this species is essentially the same as that of *Icterus gularis gularis*, and like that form it shows decided preference for the mimosa growth of the foothills and lower country. San Salvador is by far the highest altitude where *pectoralis* was found in any numbers, and it is notable that the iscanál (*Acacia cornigera*) and other mimosa growth which is so luxuriant at lower elevations here also reaches practically its upper limits. On Volcán de San Salvador the clearing of the forest has permitted a few pairs to find congenial surroundings right up to the edge of the cloud forest and even for a short distance into the coffee groves.

Of the three common lowland species of *Icterus*, this is decidedly the least abundant, being greatly outnumbered by both *gularis* and *sclateri*.

Nesting.—The nests built by *pectoralis* are somewhat intermediate in character between those of *gularis* and *sclateri*, but nevertheless are characteristic of the species. They are constructed of material much

firmer than that employed by *sclateri*, or at least the weaving is tighter and therefore a more durable nest results. A typical nest taken at Lake Guija, May 27, 1927 was twenty inches in length and about six inches in outside diameter at the nest chamber. It was closely woven of coarse grass, vine tendrils, and soft, thin, inner bark-strips. The site was a fork at the tip of one of the higher branches of a mimosa bush in which were occupied nests of six other species, including *Icterus gularis*. The nest contained three nearly fresh eggs which measure, respectively, 29.3×18 ; 29.1×17.8 ; and 28.1×17.7 . They are of the usual oriole type, elongate-ovate in shape, and with the bluish white ground color spotted and lined with extremely irregular markings of black, principally about the larger end. The nesting season commences in early April and extends through May. A nest noted at Miraflores on June 7, 1927, contained three half-grown young.

Plumage notes.—The plumage sequence of *pectoralis* is exactly as in *sclateri* and *gularis*; that is to say, the juvenal wing and tail feathers are normally carried until the end of the second summer (first postnuptial molt). In the matter of body plumage the head, underparts, and rump of the postjuveniles have the yellow duller and less pure, and usually there is only a trace of spotting or even none at all on the pectoral region. The back is mixed olive-green and black, the former predominating. In the spring the first pre-nuptial molt increases the amount of black, and sometimes new (black and white) tertials are acquired also. This first prenuptial molt is variable, no two individuals being affected to the same degree. The adult plumage is attained at the first postnuptial (second fall) molt.

The juveniles of *pectoralis* and *sclateri* are sometimes very similar in appearance, but may be most readily distinguished by the patterns of the white or whitish wing markings which are similar to those of the adults of the respective species.

There appears to be no spring molt in the adults. The annual molt commences about August 15. Although the adults are essentially alike, there is no question that females average less intensely colored and have the under surface of the tail less purely black. A pair of caged birds seen in San Salvador had the body plumage a pure lemon-yellow instead of the normal orange.

Colors of soft parts.—Adults, sexes alike: bill, black with basal one-third to one-half of mandible pale, light blue; iris, dark brown; tarsi and feet, bright, plumbeous blue. Juveniles: maxilla, dark

brown; mandible, pale brown with basal one-third flesh color; tarsi and feet, plumbeous; iris, dark brown.

Stomach contents.—Insects exclusively, 3; fruit pulp and small beetles, 1.

***Icterus sclateri sclateri* Cassin. SCLATER'S ORIOLE.**

Icterus sclateri Cassin, Proc. Acad. Nat. Sci. Phila., 19, p. 49, 1867—Nicaragua and Guatemala (=Presidio Granada, Nicaragua); Ridgway, Bull. U. S. Nat. Mus., 50, pt. 2, p. 297, 1902—part, Salvador; van Rossem, Condor, 16, p. 12, 1914—Salvador.

Icterus sclateri connectens Griscom, Amer. Mus. Novit., 438, December 15, 1930, 17 (San Salvador).

Icterus sclateri sclateri van Rossem, Condor, 29, January, 1927, 76, part (Lake Olomega; Sitio del Niño [Lake Chancico]; San Salvador; crit.).

Specimens and records.—San Salvador, 8 (March 7, 11, 14, 30; April 2, 3, 9, 1912); Barra de Santiago, 2 (April 10, 1927); Chilata, 1 (April 27, 1927); Lake Chancico, 1 (June 6, 1912); Miraflores, 1 (June 6, 1927); Sonsonate, 1 (July 17, 1925); Lake Olomega, 6 (April 7, 8, 1926; July 30, August 21, September 5, 10, 1925). Also noted at Zapotitán (June 12, 1912).

Status.—Fairly common summer visitant to the coastal lowlands and coastal mountains below 2,500 feet. Dates of arrival and departure are March 7 and September 10 (fig. 26).

Remarks.—The range of the subspecies *sclateri* is in the coastal lowlands and foothills from western El Salvador to northwestern Costa Rica. The characters distinguishing it from *Icterus sclateri alticola* of interior Guatemala are of smaller size combined with more yellowish (less orange) coloration and more spotted, less solidly black back.

In El Salvador the most typical specimens were taken on the coastal plain. Examples from the interior, for instance San Salvador, are intermediate toward *alticola*, thus rendering the determination of individual specimens rather uncertain unless, as in the present case, one has a sufficiently large series to permit averaging the characters shown. The relative amount of black present on the backs of adults is not of value in identifying individual specimens of any of the three forms of *sclateri*. The junior writer showed this to be the case several years ago, and much additional material examined since that time has only served to confirm the comments then made. Indeed, the type of *sclateri* is a bird with the back almost solidly black, as indicated in Cassin's original description and verified for us by Dr. Stone of the Philadelphia Academy of Natural Sciences, who has kindly sent us

notes on the type. Griscom has lately described a race, *I. s. connectens*—the name to apply to El Salvador foothill specimens which are intermediate between *sclateri* and *alticola*. While there is no question that El Salvador specimens from the foothill region average with more black in the back than do Costa Rica specimens of *sclateri*, the fact remains that the type of *sclateri* is a bird with the back almost solidly black, and from a geographically intermediate region. If it be desirable to recognize by name the small, spotted-backed Costa Rica birds as distinct from *sclateri*, a new name will have to be

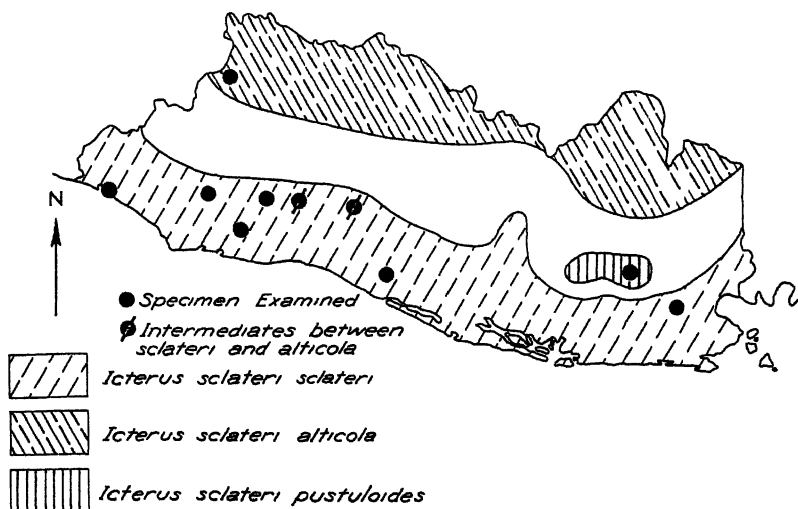


FIG. 26. Distribution of three races of the oriole, *Icterus sclateri*, in El Salvador.

given them. Although the type locality of *sclateri* has been given as "San Juan," Nicaragua, it is actually (fide Stone) Presidio Granada, a locality far to the north of San Juan.

It is not generally known that *sclateri* is largely a migratory form. The field record and notes for 1912 show that some form of Sclater's oriole was taken at San Salvador on February 23, and in 1927 the species was noted at Rio San Miguel February 4. These are the only winter records for El Salvador, and in the absence of specimens of racial identity is in doubt. However, Griscom states that he has positive knowledge of winter specimens from practically the entire range of the species. While it seems to be true that a very limited number of birds do winter in El Salvador, there is no gainsaying the fact that the very great majority leave the country entirely at that season.

Sclater's oriole is generally distributed throughout its local range, but favors light second growth, mimosa scrub, and more open sections generally. The influx commences in early March, and by the middle of the month the birds have become common everywhere in suitable country. Pairing takes place immediately after arrival, and couples are soon occupied with the long, laborious task of nest-building. In late summer and early fall one usually finds these orioles in family parties of half a dozen or so, wandering about the woods in search of fruiting trees and shrubs. After the first of September they become decidedly less numerous. The last birds of the season were seen and a specimen was taken on September 10, 1925.

Nesting.—The long pendent nests of all the three common orioles (*pectoralis*, *sclateri*, and *gularis*) are conspicuous objects everywhere in their respective ranges. There is never the slightest effort at concealment, for the sites chosen are invariably protected by heavy thorns, wasp nests, locations immune from disturbance by anything without wings, or a combination of all three. They may be anywhere from ten to fifty or more feet above the ground, swung from the outermost tips of the foliage of some long slender branch, or a spray of thorny mimosa. An interesting addition to the list of available sites is that of telephone wires, although this location is more frequently used by *gularis* than by *sclateri* and *pectoralis*.

All three species are solitary nesters so far as association with their own kind is concerned, but still the communal instinct, so general in the family, finds expression in association with closely allied species. In perhaps the majority of instances one finds *sclateri* and *gularis* nesting side by side, the nests hanging within a few feet of one another in the same tree. Not rarely *pectoralis* is also a member of such a group. This nucleus further serves as a gathering point for still other and often very different species such as flycatchers, becardas, doves, and cactus wrens, even to the point where seven species were found nesting simultaneously in one bush, in addition to several others in an adjacent tree (see also under *Platypsaris aglaiae sumichrasti*).

The nests of *sclateri* vary from 18 inches to 2 feet in length, with an outside diameter of 5 to 6 inches at the bottom (pl. XX, fig. 2). Between the entrance, which is at the top, and the cup the nest is usually very much narrower, and only large enough to permit the passage of the parents. The materials used are long grass strips and similar soft and easily woven fibers. This gives the nest a characteristic shape and appearance, which easily distinguishes it from the

nests of *gularis* and *pectoralis*. Although the finished nests of *sclateri* are all very similar in appearance, there is the greatest imaginable latitude in the methods employed by the builders. The most usual procedure is to begin at the top and make a practically complete job as they progress downward, and to close the bottom when the desired length has been attained. Other nests may be very sketchily woven into the desired length and shape and subsequently interlaced and thickened. But the most original (and one may say even startling) method is to begin on one branch of a fork, weave a long flat ribbon to a length of four feet or more, and then bring the dangling end up and secure it to the opposite branch of the fork. Field notes on one such nest are as follows: "Three days ago this last nest was a long, flat ribbon of woven and twisted grass, consisting of two lateral ropes laced together, about five feet in length. Today the birds had caught up the lower end and woven it into supporting twigs beside the upper, thus forming a pouch open on two sides. They were lacing and weaving together these open sides, using long streamers of grass in the work." The notes were made at Lake Guija on May 28, 1927, and refer to the subspecies *alticola*. They are included here in a specific sense.

Many nests are completed by the middle of April, but other pairs do not finish building until late May. Whether these are second layings or are simply late nestings is not known. In 1912 several sets of three, four, and five eggs were collected or noted from early May until late June. These eggs (all of the subspecies *sclateri*) are not now available for measurement.

Plumage notes.—In both sexes the mature plumage is not attained until the first postnuptial (second fall) molt. During the first year the greenish juvenal rectrices and dusky remiges are retained, and the body plumage, while of the exact pattern as in the adult, is relatively dull-colored everywhere and more or less tinged with olive-green. The first prenuptial molt is very inconspicuous and some birds skip it entirely. The annual (postnuptial) molt occurs rather early and is complete or nearly so by migration time in early September.

The question of the relative amounts of black and yellow in the backs of adults is very likely to cause confusion in the identification of simple specimens. Exclusive of the birds of northwestern Costa Rica and southwestern Nicaragua, where black-spotted, yellow backs are found apparently to the exclusion of all other types, the amounts vary individually and with season. In fresh fall plumage there is

naturally more yellow present than in worn spring and summer specimens, for the yellow tips and edgings soon become worn away. However, individual variation is by far the most important factor. No one can deny that the races *alticola* and *pustuloides*, taken in series, exhibit a tremendously greater amount of black than does a series of *sclateri*. Moreover in the two former races there is very little individual variation, and the backs constantly possess black very much in excess of yellow. However, in western Nicaragua and El Salvador *sclateri* varies from the spotted-backed type, to an extreme in which the back is as solidly black as in the very blackest extreme of *alticola*.

Incidentally, *pustulatus* Wagler is certainly the geographic representative of the *sclateri* group in western Mexico. The name has many years of priority over *sclateri*, but we forbear using it pending a review.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; bill, black with basal half of mandible light, delft blue; tarsi and feet, plumbeous blue.

Stomach contents.—Insects exclusively, 2.

***Icterus sclateri alticola* Miller and Griscom. GUATEMALA
ORIOLE.**

Icterus sclateri alticola Miller and Griscom, Amer. Mus. Novit., 184, p. 4, September 24, 1925—Progreso, Guatemala.

Icterus sclateri sclateri van Rossem (not of Cassin), Condor, 29, p. 75, 1927—part, Divisadero; Lake Olomega.

Specimens collected.—Lake Olomega, 1 (April 11, 1926); Divisadero, 6 (September 27 to October 14, 1925); Lake Guija, 4 (May 23 to 28, 1927).

Status.—Summer resident about Lake Guija in the extreme north-west corner of the republic. Occurs as a common fall migrant along the foothills of the interior mountains and as a rare spring migrant at Lake Olomega (fig. 26).

Remarks.—This race, the metropolis of which is the western half of the Rio Motagua Valley of Guatemala, breeds rather commonly in the broken hill country about Lake Guija and possibly in other portions of the interior.

The characters which are to be relied on to distinguish *alticola* from *sclateri* are the color, which is almost exactly of the same shade as in *Icterus gularis gularis*, and the decidedly larger size. The latter

character, though evident in printed measurements, is still more obvious on direct comparison. *I. s. alticola* has also, as an average character, a very great deal more of black in the back than *sclateri*, but this is not absolutely infallible. Wing measurements of the seven fully adult males of *alticola* range from 109 to 112.5, the smaller being those with primary quills not fully grown out.

At Divisadero, from September 27 to October 14, 1925, *alticola* was migrating in large numbers through the mimosa growth. Whether it is also a summer resident in this same region is problematical, although entirely possible. At any rate, the flights were over by the middle of October, and none was seen after the 14th of that month. Sclater's orioles of some race were noted at Rio Goascorán on October 25, 1925, but no specimens taken. In the spring an unequivocal example of *alticola* was taken at Lake Olomega on April 11, 1926, a date on which *sclateri* was paired and nest-building in the same locality.

Nesting.—At Lake Guija in late May, 1926, several pairs were found nest-building along the numerous small streams which drain the lake to the southeast. One set of four eggs was collected on the 23rd, but this must have been rather early for, as above stated, all other pairs were nest-building on this date. This race, from the evidence available at present, breeds about one month later than does *sclateri*. The eggs collected measure: 27.3×18.5 ; 27.2×18.3 ; 26.9×18 ; and 26×18.4 . The ground color is white with a pale bluish tinge and all of the eggs are much more heavily and more evenly marked than the sets of *Icterus pectoralis* and *Icterus gularis* described. For nest-building, sites chosen, and other information, see under *sclateri*.

Colors of soft parts.—See under *sclateri*.

Stomach contents.—Insects exclusively, 3; insects and small berries, 2.

***Icterus sclateri pustuloides* van Rossem. SAN MIGUEL ORIOLE.**

Icterus sclateri pustuloides van Rossem, Condor, 29, p. 76, 1927—Volcán de San Miguel, Dept. San Miguel, El Salvador; Griscom, Amer. Mus. Novit., 438, p. 17, December 15, 1930—Volcán de San Miguel (crit.).

Specimens collected.—Volcán de San Miguel, 8 (March 15 to 24, 1926); Lake Olomega, 1 (September 11, 1925).

Status.—Breeds on Volcán de San Miguel at from 2,500 to 3,000 feet altitude and occurs in the nearby lowlands (Lake Olomega) during the fall migration (fig. 26).

Remarks.—This very local, but strongly marked, race is confined during the breeding season to the upper fringes of the Arid Lower Tropical Zone forest and the Arid Upper Tropical oak groves on Volcán de San Miguel. Its characters are the rich, orange-red coloration, combined with smaller size. The least reddish example of the seven adult males is precisely the same color as the richest and most reddish *alticola* we have examined, but is, of course, decidedly smaller.

The three resident races of *Icterus sclateri* may be summarized as follows:

Size smaller (wing averaging about 105 mm.)

Coloration yellow to orange-yellow (coastal lowlands and coastal hill country) —*sclateri*.

Coloration reddish orange to orange-red (Volcán de San Miguel; migrating through the lowlands) —*pustuloides*.

Size larger (wing averaging about 112 mm.)

Coloration yellow-orange to reddish orange (interior) —*alticola*.

It is assumed that *pustuloides*, like *sclateri* and *alticola*, is migratory and leaves the country (at least to a large degree) during the winter months, for a migrant, unquestionably of this race, was taken at Lake Olomega on September 11, 1925. However, the specimens taken on San Miguel were mated and had started nest-building by March 15, at least a month earlier than is customary with *sclateri* and a good two months earlier than *alticola*.

Plumage notes.—One of the males of this race and also a specimen of *alticola* have on each side of the breast three or four small linear spots of black, thus showing in slight degree a condition similar to that found more fully developed in *pectoralis*.

***Icterus gularis gularis* (Wagler). LICHTENSTEIN'S ORIOLE. CHORCHA.**

Ps[arocolius] gularis Wagler, Isis, p. 754, 1829—Tehuántepec, Oaxaca (ex Lichtenstein, manuscript).

Icterus gularis Cassin, Proc. Acad. Nat. Sci. Phila., p. 49, 1867—part, Salvador; Salvin and Godman, Biol. Centr.-Amer., Aves, 1, p. 475, 1887—part, Acajutla; Berlepsch, Auk, 5, pp. 455-6, October, 1888—Salvador (crit.); Griscom, Amer. Mus. Novit., 438, pp. 14-15, December 15, 1930—in text, Salvador (crit.).

Icterus gularis gularis Ridgway, Bull. U. S. Nat. Mus., 50, pt. 2, p. 285, 1902 —(citations of above); van Rossem, Condor, 16, p. 12, January, 1914—Salvador.

Specimens and records.—San Salvador, 6; Divisadero, 5; Puerto del Triunfo, 2; Monte Mayor, 1; Rio San Miguel, 2; Miraflores, 2; Sonsonate, 4; Lake Olomega, 1; Lake Guija, 2; Volcán de Santa Ana, 3; Chilata, 1; Barra de Santiago, 1. Also noted at Volcán de San Salvador; Lake Chanmico; Rio Goascorán; San Miguel; Mt. Cacaquatique; Colima. Recorded from Acajutla.

Status.—Common resident of wooded or semiwooded country from sea level to 4,500 feet. Most numerous in the mimosa associations below 2,500 feet.

Remarks.—In his recent review (sup. cit.) of the Central American forms of *Icterus gularis*, Griscom has described three new races from Guatemala—a diminutive one from the Pacific slope and two very large ones from the arid interior but on the Atlantic drainage. While we are very glad to say that we are in entire agreement with Griscom as to the validity of the Guatemala races (van Rossem having gone over the series in 1927 in company with Griscom and Dwight), we regret that his careful work throws very little light on the systematic status of the El Salvador birds. Briefly, the individual variation within the series from El Salvador shows that about one-third could be forced into the small Pacific-coast race, *I. g. troglodytes*. However, these specimens are from such widely scattered points as Barra de Santiago, Sonsonate, Divisadero, San Salvador, Miraflores and Puerto del Triunfo; and in the same localities other birds were taken which are entirely too large to be *troglodytes* and yet are not large enough to be *I. g. gigas* or *I. g. xerophilus*. Taken as a whole the El Salvador series is referable only to *Icterus gularis gularis*. The only two solutions to account for this condition are, either that a tongue of *gularis* extends southward from southern Mexico through eastern Guatemala and thence into El Salvador, as in the case of *Aimophila rufescens rufescens*, or else that *xerophilus* and *troglodytes* have become thoroughly fused in El Salvador and the combination has produced a race with the characters of *gularis*. We believe the first hypothesis to be correct.

Measurements of El Salvador birds are as follows, adults only:

	Wing	Tail
12 males	120-131(124.8)	100-109(104.7)
10 females	112-120(115.3)	99-104(100)

The local distribution of *Icterus gularis* is almost exactly coincident with that of the mimosa growth. The species is most numerous in the lowlands and in the foothills to about 2,500 feet, for it is below that altitude that mimosa of several species grows most luxuriantly.

The clearing of the forests on mountain slopes has permitted both the mimosa and, following it, the orioles to reach at least 4,500 feet on both the volcanoes of Santa Ana and San Salvador, although under primitive conditions such an elevation is far above the normal ranges of either. On Mt. Cacagatique the hills are to a large extent forested with primitive woods, and not a single Lichtenstein's oriole was noted anywhere. During the descent of the south slope, the first mimosa was encountered at about 2,000 feet and from that point clear to Divisadero the orioles were noted in their usual numbers. Similarly, although *Icterus gularis* was found to be common in the valley of the Lempa at Colima at an altitude of 1,000 feet, not a single individual was observed on the arid huacal (*Crescentia*) plains north of that point. Neither did *gularis* extend up the fingers of Arid Lower Tropical Zone which interdigitate with the oak-pine association of the Arid Upper Tropical as high as San José del Sacare.

These orioles are permanently resident and adults remain in pairs throughout the year. After the family parties disintegrate in the late fall and early winter, the young are often seen in small flocks of four or five, but by spring they, too, have to a large extent paired off.

Nesting.—The nests of *gularis* are characteristic and not to be mistaken for those of any other local oriole (pl. XX). The nests are more or less cylindrical, that is of nearly equal diameter throughout, from fifteen to twenty inches long and five or six inches in diameter. The material employed is always a fine, springy tendril from an unknown source (possibly an aerial rootlet), woven rather tightly and with no loose ends left dangling. At the bottom is the nest-cup, well padded with plant down, grass, and other soft wadding. The usual sites are the tips of branches at varying heights from the ground, but sometimes the nests are hung from telephone wires, particularly if there happen to be a few tufts of epiphitic growth to provide a starting point. The season commences earlier than with *sclateri*, *alticola*, and *pectoralis*, for nests are often ready for occupancy as early as March 15. Many pairs, however, do not lay until well along in May. The latest date for fresh eggs is June 6, 1912, when a set of four was collected at Lake Channmico.

The eggs are similar to those of *sclateri* and *pectoralis*, that is, they are elongate ovate, with the bluish white ground color lined, scrawled, and irregularly spotted with black. A set of three eggs collected at Lake Guija May 23, 1927, measure respectively: 29.8×19.2 ; 29.6×18.5 ; and 29.1×19.3 . Three and four eggs are the usual numbers laid.

Plumage notes.—Although the sexes are usually described as alike, the females have, on the average, smaller throat patches than the males, and the upper rump is tinged with olive-green next to the black back. In general both the blacks and yellows are less pure than in the males. The time required to obtain the highest plumage may be three years, as in *Icterus spurius*. This is almost certainly the case with females.

The postjuvenile plumage is that described by Ridgway as "Immature (second year?)." At this age the throat patches of the females are very restricted and mixed with yellow. Those of the males are larger and very much blacker, but otherwise the sexes are very similar. Some young birds have a first prenuptial molt which affects chiefly the foreparts and back, but in four out of six cases the postjuvenile plumage is worn with no discernible change for a full year or until the first postnuptial (second fall) molt. This first postnuptial has produced in the cases of three females a livery like that of the adults except that the back is more or less mixed with yellowish green. Certainly in these cases, at least, maturity was *not* reached at that time, and as there is apparently no spring molt (except in a few first-year birds) the fully adult plumage could not have been acquired by these individuals until the third fall (second postnuptial) molt. Specimens showing the change from first nuptial to second fall plumages are not represented among the males at hand.

Two adult males and one adult female show traces of black pectoral spotting—an incipient tendency also seen in the species *slateri*.

Colors of soft parts.—Postjuveniles: iris, dark brown; bill, black, mandibular rami, pale bluish at base; tarsi and feet, grayish plumbeous. Adults: similar but base of mandible, tarsi, and feet, plumbeous blue.

Stomach contents.—Small ants, 1; insects, 1; insects and berry seeds, 1; berry seeds and pulp, 1.

***Icterus chrysater chrysater* (Lesson). UNDERWOOD'S ORIOLE.**

Xanthornus chrysater Lesson, Oeuvr. Compl. Buffon, 7, p. 332, 1847—Mexico.

Specimens collected.—Mt. Cacaguatique, 23 (November 22 to December 19, 1925); Volcán de Conchagua, 10 (February 25 to March 6, 1926); San José del Sacare, 1 (March 14, 1927); Volcán de San Miguel, 2 (March 13, 21, 1926).

Status.—Common, locally even abundant, in midwinter and spring in the pine-oak association of the Arid Upper Tropical Zone along the cordillera, on Volcán de San Miguel, and Volcán de Conchagua. The vertical range is from 3,500 to 4,000 feet.

Remarks.—The identity of *Icterus gualanensis* Underwood remained in doubt until Bangs¹ cleared up the uncertainty by showing that the type was nothing more than an exceptionally black-headed specimen of "*Icterus giraudii*" [= *chrysater*].²

At the time Ridgway wrote Part 2 of *The Birds of North and Middle America*, he described (under *Icterus giraudii*) the sexes as "alike" although stating in a footnote (p. 294) that he was sure that the sex of many of his specimens had been erroneously determined. The series of 36 specimens collected in El Salvador demonstrates that not only are the sexes decidedly *unlike*—so much so that they can be distinguished without difficulty in life—but that Central American birds are subspecifically distinct from *giraudii* of Colombia. Through the courtesy of the American Museum of Natural History we have been able to examine eight skins of typical *giraudii* from the highlands of Colombia, all recently taken and sexed by collectors whose reliability is beyond question. Comparison of the two series shows that El Salvador birds are slightly but uniformly larger and that, while there is little or no color difference between males from the two areas, El Salvador females are very much darker and browner than Colombian. Thus in *giraudii* there is relatively little color difference between the sexes, while in the El Salvador series the difference is uniform and striking.

Comparative measurements are as follows:

	Wing	Tail
17 adult males from El Salvador	104–114(108.7)	102–112(107.4)
4 adult males from Colombia	99–104(101.5)	100–106(104.0)
10 adult females from El Salvador	100–106(102.4)	100–105(103.1)
4 adult females from Colombia	94–99(95.5)	94–99(96.2)

It is extremely doubtful that *chrysater* is resident in El Salvador. Although common in every suitable locality visited during the winter and early spring, not a single individual was noted during the breeding season. The distribution is confined to very narrow limits, the range being the lower edge of the oaks or pines of the Arid Upper

¹ Proc. Biol. Soc. Wash., 18, pp. 167–169, 1905.

² Ludlow Griscom (Bull. Amer. Mus. Nat. Hist., 64, p. 393, 1932) has reached conclusions identical with our own regarding the characters and distinctness of the Central American race and, in addition, has shown that *Xanthornus chrysater* Lesson has priority over *Icterus gualanensis* Underwood.

Tropical and the extreme upper fringes of the Arid Lower Tropical Zone. On Mt. Cacagatique where this species was particularly abundant and ranged everywhere through the coffee shade in flocks of four or five it was only very rarely observed to straggle beyond these narrow associational limits.

There is a very noticeable affinity between these orioles and the black-headed jays (*Cissilopha*), and nearly every flock of the latter is closely attended by two to four orioles. Perhaps the real reason for the association is that the jays are great scratchers, turning over much leaf mold, and the orioles simply follow them about in order to prey on the many insects thus aroused.

Nesting.—Even specimens collected in late March were completely dormant sexually. No old nests were observed in spite of the large numbers of birds, and thus there is the possibility that *chrysater* is only a winter visitant from Guatemala and Mexico.

Plumage notes.—The series of seven birds-of-the-year shows that the postjuvénal plumage of *chrysater* is very variable. All were collected after the molt had been completed, that is, in November, December, and March. In all the body plumage resembles that of the corresponding sex in the adults, but is a little duller in color below and usually heavily overlaid with olive-green above. The number of juvenal rectrices and remiges replaced is most variable. Three birds retain these complete; the others have replaced a varying number, in one case all of them. Six of the seven are females, which indicates that this sex does not normally assume the adult plumage the first fall.

The adult females have the identical color pattern of the males, but instead of being "cadmium yellow" are "mars yellow," "xanthine orange," or pale "amber brown," becoming decidedly more yellow posteriorly and tinged (usually) with olive-green on the back and rump. They are easily distinguished from the males even in life.

In the matter of the amount of black on the foreheads of the males there is wide variation. In several El Salvador males the black extends backward as far as the middle of the eyes. In one (No. 16,589) it reaches well behind the eyes along the center of the crown, while in still another (No. 17,387) it not only reaches as far back as the posterior corner of the eye, but the feathers of the whole pileum are black, with yellow tipping and edging. Females are much more uniform. In these the black area is narrower, although, as in the males, it extends backward laterally over the eyes.

Interesting tendencies showing an incipient black-backed condition are evident in seven out of the seventeen adult males. In these there is a variable amount of black-tipping to the feathers of the lower back.

Colors of soft parts.—Adults: iris, dark brown; bill, black, basal third of mandible, delft blue; tarsi and feet, bright, plumbeous blue (nearly delft blue) with a variable amount of black mottling. First winter: similar to adults, but blue at base of mandible paler, and tarsi and feet more dusky.

Stomach contents.—None recorded. This species is to some extent destructive to bananas. It opens the fruit at the upper end and eats the pulp as far down as it can reach. As many as a dozen bananas in each good-sized bunch may be thus spoiled.

***Icterus wagleri wagleri* Sclater. WAGLER'S ORIOLE.**

Icterus wagleri Sclater, Proc. Zool. Soc. Lond., p. 7, 1857—Villa Alta, Oaxaca, Mexico.

Specimens collected.—Mt. Cacagatiqué, 6 (November 23, 27; December 14, 1925); Los Esesmiles, 1 (February 15, 1927).

Status.—Uncommon midwinter visitant to the higher interior mountains.

Remarks.—Examination of the series of *Icterus wagleri castaneopectus* in the Museum of Comparative Zoology shows that a valid race exists in Sonora and Chihuahua which differs (just as claimed by Brewster) in having a broad, well-defined, chestnut band separating the black chest from the orange-yellow underparts, and in slightly larger size. Specimens from central Mexico are variously intermediate, but the transition from one type to the other is so gradual and so spotty because of individual variation that a good series of specimens will be necessary before designating the southern limit of *castaneopectus*.¹

Besides being the rarest oriole within the boundaries of El Salvador, *wagleri* is by all odds the one of highest range in altitude. The three adults taken on Mt. Cacagatiqué were from a flock of four which was drifting through the coffee association at 3,500 feet. One of these was prepared as a skeleton. Three young males of the year from the same place were solitary. The single adult male taken on Los Esesmiles was solitary and was the only *Icterus* of any species seen in that locality. The species is apparently only a midwinter visitor to El Salvador.

¹ See also Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 392, 1932.

Plumage notes.—The three young males show an immense variation in the amount of black present on the anterior underparts due to the fact that even at very early (November and December) dates they are undergoing the first prenuptial molt. This involves the facial region, chin, throat, and upper chest, and results in a pattern of coloration like that of the foreparts of the adults of *Icterus chrysater* except that the black of the chest extends laterally.

Colors of soft parts.—Adults: bill, black, basal one-half of mandible light blue; tarsi and feet, blackish plumbeous; iris, dark brown. Young of the year: similar, but blue of mandible paler, and tarsi and feet plumbeous horn-color.

***Icterus maculi-alatus* Cassin. BAR-WINGED ORIOLE.**

Icterus maculi-alatus Cassin, Proc. Acad. Nat. Sci. Phila., 3, p. 332, 1847—"Vera Cruz" (= Vera Paz), Guatemala.

Specimens collected.—Volcán de San Salvador, 1 (June 1, 1912); Mt. Cacagatique, 1 (December 14, 1925); Volcán de San Miguel, 3 (March 12 to 20, 1926); Volcán de Santa Ana, 4 (May 7 to 20, 1927).

Status.—Uncommon resident of the Arid and Humid Upper Tropical Zones in the volcanic coastal range. Occurs, in winter at least, at the extreme upper edge of the Arid Lower Tropical on Mt. Cacagatique. The vertical range is from 2,500 to 5,000 feet.

Remarks.—Only nine specimens of this rare oriole, one of which was prepared as a skeleton, were taken in all our field work. Possibly an equal number were either seen or heard singing, but their extreme wildness, a characteristic of the species, prevented their collection.

The bar-winged oriole is pre-eminently a bird of the oaks, and only in that association was it found on the volcanoes of San Miguel, San Salvador, and Santa Ana. The single specimen taken on Mt. Cacagatique was in the coffee shade at the edge of the oak forest, and it is likely that it was simply a straggler from the oaks. All the birds encountered were very shy, so much so that at the first hint of pursuit they were more than likely to leave the locality. During the breeding season singing males invariably became silent at any unfamiliar noise and though, at this season, they did not move for any great distance, still, they might not resume singing for some time. The birds collected were in the crown foliage of trees at some distance from the ground and, unlike most species of *Icterus*, the present one has a decided preference for rather dense forest. Small flocks were seen several times in the oaks on Volcán de San Miguel,

but in May on Volcán de Santa Ana and in June on Volcán de San Salvador, only pairs were in evidence. The song is deliberate, varied, and of very superior quality. In this respect as well as in most of the details of its color pattern, *maculi-alatus* reminds one more of *Icterus parisorum* than of any of the local species. However, the very different tail structure precludes any supposition of close relationship.

Nesting.—Birds taken in May and June were all in breeding condition at the time.

Plumage notes.—Although the sexes have been supposed to be alike they are actually very different. The plumage of the adult male is well known and need not be described here, but as that of the female and of the young of both sexes appears to be unknown, it may be well to describe them. Adult female; 3 specimens: Forehead to about central line of eyes, entire facial region, chin, throat, sides of neck, and central portion of chest, uniform glossy black; entire upperparts from crown to upper tail coverts and including lesser and middle wing coverts, yellowish olive-green (between "warbler green" and "pyrite yellow"), passing into bright "warbler green" on flanks and under tail coverts; sides of breast and median underparts orange-yellow more or less tinged with the color of the flanks; wings "dark olive gray" edged on outer webs of inner secondaries with dull olive and on outer webs of five or six outer primaries with "pale mouse gray," with only a faint indication of the white markings so conspicuous in the male; tail with outer webs similar to, but slightly duller than, the back and with inner webs dark, dull, olive-green; shafts of rectrices black above and pale yellow below; bill, black with basal half of mandible pale blue; tarsi and feet, pale plumbeous blue; iris, dark brown.

One-year-old male, 1 breeding (June) specimen: Similar to the adult female, but brighter, more golden green, dorsally; flanks and under tail coverts only faintly tinged with green; upperparts with numerous, irregularly scattered, black feathers, producing a pied appearance.

One-year-old female, 1 breeding (May) specimen: Similar to the adult female, but duller-colored throughout and with black of head confined to loreal region, eyelids, chin, throat, and anterior half of auriculars; black central chest area of adults indicated by a conspicuous patch of dusky olive. Both the young male and the young female show that the juvenal remiges and rectrices are carried until the first postnuptial molt, in which respect they are similar to the majority of species in this genus.

The coloration of the soft parts of the young was not recorded. Those of the adult male are exactly like those of the adult female save that the basal part of the mandible is brighter blue, close to "russian blue."

Icterus spurius spurius (Linnaeus). ORCHARD ORIOLE.

Oriolus spurius Linnaeus, Syst. Nat. ed. 12, 1, p. 162, 1766—South Carolina.

Specimens and records.—Lake Olomega, 9 (August 16, 21, 31, 1925; April 7, 8, 12, 1926); Divisadero, 8 (September 23, 24; October 24; November 1, 2, 4, 1925); Puerto del Triunfo, 2 (January 7, 19, 1926); Rio San Miguel, 1 (February 13, 1926); San Salvador, 1 (March 11, 1912); Lake Ilopango, 1 (March 18, 1912); Barra de Santiago, 3 (April 5, 10, 12, 1927). Also noted at Colima (January 21, 1927).

Status.—Common winter visitant and abundant fall and spring migrant in the lowlands throughout the country. Occurs very uncommonly as high as 2,800 feet, the center of abundance being the coastal plain and lower foothills below 1,000 feet. Dates of arrival and departure are August 16 and April 12.

Remarks.—All the specimens taken are of the larger, typical form. The differences between typical *spurius* and the small *I. s. affinis* of Lawrence are less a matter of linear measurements than of total bulk and of comparative slenderness of bill, tarsi, and feet. In order to appreciate these differences it is of course necessary to compare birds which are definitely known to be breeding. To classify arbitrarily as "breeding" specimens¹ everything taken between "April 1 to August 15" is almost certain to lead to error, for typical *spurius* reaches El Salvador in numbers by August 16 and does not leave until about April 12.

The first arrivals were noted in the woods near Lake Olomega August 16, 1925. On this date several small bands of both immatures and fully adult birds of both sexes were busily gleaning insects from the crown of the low (50-foot) forest. By the 22nd of the month waves of old males put in an appearance, followed on the 26th by large numbers of second-year males and some females. All through the months of September, October, and November, small groups of five or six birds were common in the mimosa scrub about Divisadero, the ages and sexes being fairly well balanced. Although the fall migration was punctuated by decided waves, with one sex or the other predominant, the permanent midwinter population, until early

¹ Bull. U. S. Nat. Mus., 50, pt. 2, p. 276, 1902.

February was fairly evenly divided as to sex. During the latter part of December and all through January at Puerto del Triunfo, the balance of sexes and ages was preserved, and until the first part of February there was no apparent change in the numbers or sex-grouping of the stable winter population.

About the middle of February, in 1926, the ceiba trees on the coastal plain at Rio San Miguel were a solid mass of pink bloom, to which came unbelievable numbers of orchard orioles in search of the swarming insects. Until this sudden concentration we had noticed no sex segregation, but now it was suddenly apparent that these great flocks, composed of hundreds of individuals, were made up almost exclusively of old males. On February 20, a great ceiba standing alone in a grass pasture was watched for over an hour. No accurate estimate could be made of the number of birds present, but it certainly ran into many hundreds. The wide-spreading mat of blossoms was at least one hundred feet from the ground, and the darting, restless swarm of old males packed it literally to a point where there was no room for more. By the 22nd, on which date camp was moved to higher elevations, most of this great assemblage had left and, with few exceptions, the orchard oriole population was reduced to females and young males. We were not again in territory suitable for this species until April 6, when at Lake Olomega green birds (that is, females or young males) were very abundant everywhere. Only two old males were seen in several days spent at the lake and these only on April 12, the last day of observation. In 1927 there was no chance until April to note the migration of this species. From April 1 to 12, at Barra de Santiago, many flocks in some cases numbering as many as 50 individuals were seen, but among them not one adult male was noted. The number had diminished noticeably on the last day, when only a few were in evidence.

Orioles of the smaller species (particularly of the genus *Icterus*) are not, as a group, noted for their flocking tendencies, but *spurius* while in winter quarters is very much of an exception to this general rule. Not only does it spend the day in small groups, but it frequently concentrates still further at sundown and roosts in good-sized flocks. Such a night roost, composed of about fifty birds, was seen on many occasions in a tangle of mimosa and vines in a barranca at Divisadero. Others were observed at Barra de Santiago in the low scrub of a sand spit between the ocean and lagoon.

A physiological peculiarity which seems to have escaped general notice is the strong body scent of freshly killed birds. This odor is

particularly noticeable in males, but is present in females also. It is sharp, slightly acrid, somewhat reminiscent of petrels and is sometimes so strong that a lost bird which has dropped into leaves or grass may be located by it. It persists for some years, at least, and is at this writing (September, 1932) still apparent, though to a lesser degree than when the specimens were killed in 1925, 1926, and 1927. There are faint traces of it in some specimens of *affinis* taken as long ago as 1910. This scent seems to emanate from the plumage or the skin, for there is no discernible odor to the flesh or the oil glands at the root of the tail.

Plumage notes.—On arrival in mid-August these orioles are in fearfully abraded plumage, for they have, contrary to the usual custom, completed the migration before the annual molt has taken place. This is true of adults and young alike, and when the latter arrive they are still in soft, juvenal feather. The process of annual renewal is a relatively slow one, and not until the latter part of October (in one case November 4) is the new plumage completely acquired. Males in their second year, that is, those which have molted from the black-throated, greenish plumage of the first year to the first, brown, subadult plumage, are characterized by broad buffy tipping to the feathers of the body plumage. This tipping makes such males superficially more or less like *Icterus fuentesi*, but most of the lighter color wears off by midwinter. During early April some one-year-old spring males show a limited spring molt involving both the chin and throat, and some new black feathers appear on these parts.

Icterus galbula (Linnaeus). BALTIMORE ORIOLE.

[*Coracias*] *galbula* Linnaeus, Syst. Nat., ed. 10, 1, p. 108, 1758—"America" (= Virginia).

Specimens and records.—Divisadero, 6 (October 5, 11, 15, 1925); Mt. Cacaguatique, 2 (November 21, 30, 1925); Puerto del Triunfo, 5 (January 3, 5, 8, 19, 1926); San Salvador, 5 (February 23, 27; March 8, 20, 1912); Barra de Santiago, 2 (April 2, 5, 1927); Hacienda Chilata, 1 (April 27, 1927). Also noted at Rio Goascorán (October 28, 1925); Rio San Miguel (February 4, 1926); Colima (January 21, 1927).

Status.—Fairly common fall and spring migrant and winter visitant throughout the Arid Lower Tropical Zone. Arrival and departure dates are October 5 and April 27.

Remarks.—Unlike the orchard orioles the Baltimore orioles did not arrive until after the completion of the fall molt. The first bird

taken, an adult male on October 5, was in complete new plumage without trace of feather sheaths anywhere. No more were seen until the 11th, when they became common and the first females arrived. Although in relatively fewer numbers than the orchard orioles, the present species has a more general distribution, for the range extends from sea level to the extreme upper limits of the tongues of the Arid Lower Tropical Zone on Mt. Cacaguatique, nearly 4,000 feet. Neither was any tendency to flocking observed, and it was seldom that even two were seen together. There was no pronounced increase in numbers during the spring migration. The winter population departed gradually, and the last birds seen were two males, one of which was taken on April 27. It is probable that the bulk of the northbound migrants pass along the Atlantic slope.

Plumage notes.—As above stated, the fall molt was finished by the time the first arrivals appeared. Commencing in the latter part of February the young males of the previous year undergo a complete body molt, and by the first week in April have the pattern for the adult male. However, the color of the underparts is very much paler (pale orange-yellow) than in the adults, and the dull primaries and greenish yellow tail are retained in their entirety. Curiously enough, adult males taken during the same period show no spring molt whatsoever, and from the evidence of specimens collected there is only one molt a year in old birds. No females were collected during the spring months.

***Amblycercus holosericeus holosericeus* (Lichtenstein). PRE-VOST'S CACIQUE. PICO BLANCO.**

Sturnus holosericeus Lichtenstein, Preis-Verz. . . . Vog., Mex., p. 1, 1831
—Mexico (=Alvarado, Vera Cruz. Type ex. by van Rossem, 1933).

Specimens collected.—Lake Olomega, 4; Puerto del Triunfo, 1; Rio San Miguel, 1; Volcán de San Miguel, 2; Hacienda Miraflores, 1; Mt. Cacaguatique, 1; Barra de Santiago, 1; Sonsonate, 1; San Salvador, 5.

Status.—Common, generally distributed, resident of the Arid Lower Tropical Zone from sea level to 3,500 feet.

Remarks.—All specimens collected have the tail longer than the wing and are therefore to be referred to typical *holosericeus*. Several skins from southern Costa Rica which we have examined have the tail shorter than the wing, but as approximately only a dozen from that region have been seen by us, we cannot be absolutely certain

of the validity of the recently described *A. h. centralis*.¹ Kennard and Peters do not recognize *centralis*,² but we are inclined to believe it to be a good form. In addition to the tail and wing proportions, the bills of southern birds are more aciculate in vertical outline, and the iris appears to be more deeply colored. Kennard and Peters give the iris color of a male from Almirante, Panama, as "salmon orange," and on the label of a Costa Rica skin collected by Austin Smith it is given as "dull yellow." In adults of more northern birds the iris varies from pale "maize yellow" to "pale lemon yellow." There are possibly constant differences in the color of the bills also.

Prevost's caciques are normally found in close-growing undergrowth and, like most thicket-inhabiting species, are rather shy and at the same time intensely curious about unusual sounds or objects. They apparently go in pairs throughout the year. This species is occasionally parasitized by some sort of insect (probably a fly), for healed or semihealed maggot cysts are not uncommon in ear and eye cavities. In the event that both eye sockets became infected, death would of course ensue in a short time. One bird, a female taken at San Salvador April 4, 1912, had a cyst on the occipital region as well as behind the right eye.

Nesting.—Specimens in breeding condition were taken from April 4 to September 2.

Colors of soft parts.—Adults: iris, pale maize yellow to pale lemon yellow; bill, pale greenish yellow or greenish white, tip paler [the color of the bill of "*centralis*" as recorded by Kennard and Peters is "amber yellow, tip light lumiere green"]; tarsi and feet, plumbeous.

Stomach contents.—Insect remains, 3. Caciques were frequently caught in traps baited with corn meal which had been set for rodents in bushes or low trees. The tremendous development of the jaw muscles argues some food which makes this specialization necessary, but what it is we could not determine. Caciques were often seen or heard rapping forcibly on dead branches.

**Cassidix mexicanus mexicanus (Gmelin). GREAT-TAILED,
GRACKLE. SANATE, CLARINERO.**

Corvus mexicanus Gmelin, Syst. Nat., 1, p. 375, 1788—Mexico.

Specimens and records.—Lake Olomega, 3; Puerto del Triunfo, 1; Divisadero, 13; Monte Mayor, 1; San Sebastián, 1; San Salvador, 2;

¹ Todd, Proc. Biol. Soc. Wash., 29, p. 95, 1916.

² Proc. Bost. Soc. Nat. Hist., 38, p. 464, 1928.

Lake Chanmico, 1; Sonsonate, 2; Los Esesmiles, 4. Also noted at Volcán de San Salvador; Ciudad Barrios; Rio San Miguel; Colima; Chilata; Volcán de Santa Ana; Lake Guija.

Status.—Common, locally abundant resident of open or semi-wooded areas everywhere below 7,000 feet altitude.

Remarks.—As indicated by Ridgway¹ southern examples are somewhat larger than those from Texas. The relative heaviness of the tarsi, bills, and feet is particularly noticeable. In addition the females are slightly darker and the males more steely blue (less violaceous) dorsally. Everything considered, there might be justification for recognizing a Central American race of this species. There is no local variation with altitude, specimens taken at or very near sea level being identical with those from the mountains. In size the El Salvador series averages as follows, adults only:

	Wing	Tail	Culmen from base	Depth at base	Tarsus	Middle toe minus claw
9 males.....	198.7	209.6	46.8	16.1	52.6	37.7
14 females.....	154.3	154.1	37.8	13.6	42.8	30.4

Few birds possess the adaptability to fit themselves into such a wide variety of habitats as do these large grackles. The vertical range begins at sea level. At Puerto del Triunfo they were observed as inveterate combers, not only of the beach itself, but of the mud flats beneath the maze of mangrove roots. From this point the range extends upward to the high pine region to at least 7,000 feet on Los Esesmiles. They are everywhere common, and locally, as in the cornfields of the lower foothills, may be altogether too numerous, for in El Salvador, as elsewhere, their chief weakness is sprouting corn. In certain districts, such as about Divisadero in the fall, these grackles are unquestionably responsible for a great deal of damage to growing grain.

During the fall and winter months the great-tailed grackles congregate in flocks numbering from a dozen or more up to hundreds. These flocks, which wander widely during the day, return night after night to the same roosting places. At Puerto del Triunfo the local roost was on one of the many mangrove islands in the bay. Every evening shortly before sundown the birds would come streaming in from the back country, flying swiftly over the forest with just enough elevation to clear the trees and heading directly for the island. The uproar they made was continuous from sundown until dark and was audible half a mile away.

¹ Bull. U. S. Nat. Mus., 50, pt. 2, p. 239, footnote, 1902.

Nesting.—Breeding begins very early in the spring, even in the highlands. The break-up of the winter assemblages does not take place all at once, but begins gradually about February 1, and as pairs detach themselves from the flocks they at once set about nest-building. The first eggs are laid about March 1, a date when the greater proportion of the population is still drifting in small groups about the country. At Los Esesmites several small colonies, usually of six or eight pairs, were noted in the pines and also in thorny hedgerows along the main trail leading toward the Honduras border. A group of six nests in a thorny hedge on this trail was examined March 9, 1927. They were large replicas of red-winged blackbirds' nests, laced firmly into the maze of twigs and thorns and about fifteen feet from the ground. Two of them held two eggs each, possibly incomplete sets, although the females had been sitting for at least three days. One nest of this colony was about half finished; the other three were not examined closely enough to determine their contents. One set measures 34×22.8 and 32.1×22 ; the other is 34.7×22.5 and 33.5×22.1 . The ground color varies from "pale olive-gray" to "light olive-gray," over which there is the usual series of black or brown scrawls and heavier markings.

The first young appear on the wing in early May, but nesting continues through July. On the 25th of the latter month there were still young in some of the nests belonging to a colony of some twenty pairs at Lake Olomega. On others, adults were apparently incubating eggs even at this late date.

Plumage notes.—As is well known, the males of this species do not reach maturity until the first postnuptial (second fall) molt. The one-year-old males may easily be distinguished by their dull, rusty black coloration and smaller size.

Colors of soft parts.—Adult males: iris, bright lemon-yellow; bill, tarsi, and feet, black. Adult females: iris, pale yellow or yellowish white; bill, tarsi, and feet, dull, brownish black. Juveniles (sexes alike before the postjuvinal molt); iris, bill, tarsi, and feet, dark brown.

Stomach contents.—Corn exclusively, 10; corn and miscellaneous seeds, 2.

Tangavius aeneus aeneus (Wagler). RED-EYED COWBIRD.
TORDITO.

Psarocolius aeneus Wagler, Isis, von Oken, 22, Heft 7 (July), col. 758, 1829—Mexico (=Mexico City, see van Rossem, Trans. San Diego Soc. Nat. Hist., 7, p. 334, 1934).

Specimens and records.—Divisadero, 9; Lake Ilopango, 1; San Salvador, 3; Volcán de San Salvador, 1; Puerto del Triunfo, 2; Hacienda Miraflores, 1; Sonsonate, 5; Lake Guija, 3. Also noted at San Sebastián; Santa Rosa; Rio San Miguel; Colima; Barra de Santiago; Volcán de Santa Ana.

Status.—Common resident throughout the Arid Lower Tropical Zone and locally, on the coastal ranges, into the edge of the Humid Upper Tropical area. The vertical range is from sea level upward to 5,000 feet.

Remarks.—Except during the breeding season, red-eyed cowbirds normally wander in large flocks. Occasionally they consort with the grackles, but as a rule each species is likely to keep pretty well to itself. The largest cowbird assemblages noted were a flock estimated at between 400 and 500, which was seen in some bare trees along the road near Santa Rosa on October 24, 1925, and another of about 100 which was beach-combing through the litter of the high-tide mark at Barra de Santiago on April 1, 1927. Groups of less than 50 were decidedly more numerous, and the average fall, winter, and early spring flocks contained 25 or 30 birds each.

The great disparity in the relative numbers of males and females is noticeable even in the winter flocks, but becomes still more apparent when the spring break-up occurs. About April 1 or even a little earlier, the flocks disintegrate into little bands consisting almost invariably of a single old male and his harem of four or five females. This small group retains its identity as a unit until the following fall. The male is in constant attendance, strutting with shoulder tufts raised and chest puffed out before first one and then another of his flock, who for the most part ignore him completely.

Nesting.—In spite of the abundance of cowbirds in most lowland localities, not one juvenile was collected or observed, and even one-year-old birds seemed to be relatively rare, for only six were collected. Neither was a single egg found in any of the small birds' nests examined. Dissection of specimens showed the laying season to be from late April until early July. The natives claim that the three, common, lowland orioles, namely *Icterus gularis*, *Icterus sclateri*, and *Icterus pectoralis*, are the species most often victimized by the insect parasite.

Plumage notes.—Neither sex reaches maturity until the first post-nuptial molt. One-year-old males are variously intermediate in coloration between adult males and adult females, but acquire more

of the male coloration at the time of the prenuptial molt in spring. One-year-old females are duller and less metallic than mature ones and are also slightly smaller. The annual (postnuptial) molt of the adults takes place in September and October. Adults as well as one year-old birds have a spring molt, limited in extent and consisting chiefly of the replacement of a relatively few feathers about the interscapular region, breast, and head.

Colors of soft parts.—Adult males in winter: iris, brownish orange to orange-brown; bill, tarsi, and feet, black. Adult males in summer: similar, but iris, scarlet to crimson. Females (adult and birds of the year alike at all seasons): iris, similar to adult males in winter, but averaging paler; bill, tarsi, and feet, brownish or plumbeous black.

Stomach contents.—Milo maize or Egyptian corn, 2; miscellaneous small seeds, 9; caterpillar, 1.

Family THRAUPIDAE.¹ Tanagers

Chlorophonia occipitalis (Du Bus). MEXICAN CHLOROPHONIA.

Euphonia occipitalis Du Bus, Esquis. Orn., pl. 14, 1847—Mexico.

Specimens collected.—Los Esesmiles, 4 (February 2 to 9, 1927); Volcán de Santa Ana, 4 (May 6 to 16, 1927).

Status.—Fairly common resident of the Humid Upper Tropical Zone on Los Esesmiles (7,500 to 8,000 feet) and Volcán de Santa Ana (5,000 to 6,500 feet).

Remarks.—The Mexican chlorophonia is confined to the cloud forests of the Humid Upper Tropical Zone. It is relatively rare in El Salvador and was met with on but few occasions, on all of which the birds were either solitary or in pairs. The specimens collected were all some distance above the ground, thirty to fifty feet, and were working on clumps of mistletoe in oaks and other hardwoods.

El Salvador specimens are only provisionally referred to *occipitalis*, for there are, so far as we are aware, no Mexican examples, other than skins of a caged bird or two, available for comparison in America.

Nesting.—The Los Esesmiles birds, although apparently paired, were not breeding in early February. On the other hand, the three females collected on Volcán de Santa Ana in early May had obviously finished laying some weeks previously. The nesting season, therefore, would appear to be in March or April.

¹ It has seemed inexpedient to change certain names in this family to accord with Hellmayr's recent findings, since this would involve considerable resetting of type. See Field Mus. Nat. Hist., Zool. Ser., 13, pt. 9, 1936.

Plumage notes.—Although “immature” males and females of *Chlorophonia callophrys* are described by Ridgway¹ as similar to the adult female except for the absence of blue on the pileum and hind-neck, we are certain that the description applies to juveniles. After the postjuvinal molt is complete, the young of both sexes are, in color, exactly like the adult females, both in *Chlorophonia callophrys* and *Chlorophonia occipitalis*.

Colors of soft parts.—Adults (sexes alike): iris, brown; bill, olive-green, with culmen (broadly) and tip of mandible, dull black; tarsi and feet, horn color.

Stomach contents.—The food of *Chlorophonia occipitalis* is mistletoe berries to the apparent exclusion of everything else. In this it agrees with the members of the genus *Tanagra*.

***Tanagra elegantissima vincens* (Hartert). CENTRAL AMERICAN BLUE-HOODED EUPHONIA.**

Euphonia elegantissima vincens Hartert, Bull. Brit. Orn. Club, 33, p. 77, Dec. 23, 1913—Costa Rica and Chiriqui.

Specimens collected.—Mt. Cacaguatique, 2 (November 30 to December 11, 1925); Los Esesmites, 3 (February 26, 1927); Volcán de Santa Ana, 15 (May 7 to 15, 1927).

Status.—Locally a fairly common resident of the Humid Upper Tropical Zone (fig. 27).

Remarks.—Though *vincens* was originally supposed to be limited to Costa Rica and Chiriqui, we have no hesitation in assigning all Central American birds of this species to that race. Compared with Mexican examples, the blue of the hood in both sexes is definitely darker and more purplish regardless of the condition of the plumage. Females from Central America average brighter and richer green when specimens in equivalent plumage are compared. Although we are unable to verify the supposedly larger size of *vincens* or the character of a lighter forehead, the race is well distinguished by the features given above.

Blue-hooded tanagers were first found in November and December, 1925, in the mistletoe-covered oaks on Mt. Cacaguatique. On November 30 a solitary female was shot from a clump of mistletoe in the topmost branches of a tall, nearly leafless oak. Later, on December 11, an adult male, one of a flock of three, was taken in a similar situation. In February of 1927 two evidently mated pairs

¹ Bull. U. S. Nat. Mus., 50, pt. 2, p. 7, 1902.

were found feeding at a mistletoe clump in an oak grove just below the summit of Los Esesmites. They would have been passed by had not their hard, metallic, finchlike call-notes directed attention to them. Blue-hooded tanagers are probably more common on Los Esesmites than this one small flock would indicate, for conditions appear to be ideal for the support of a large population. However, their habit of feeding in the higher trees makes them difficult to detect unless, as in the case noted, one happens to hear their characteristic call-notes. Whether this species is permanently resident on Mt. Cacaguatique is doubtful, for it appears to be confined during the breeding season to the Humid Upper Tropical cloud forest.

No difficulty was experienced in obtaining on Volcán de Santa Ana an adequate series of specimens. In that locality in May, 1927, single birds, pairs, and family parties were common everywhere in the cloud forest which extends from 4,500 to 7,000 feet on the north slope of the mountain. The breeding season was evidently only recently past, for the young birds, although fully grown, were in unworn juvenal plumage.

Nesting.—Specimens taken during November, December, and February were sexually dormant. Nesting must occur in late March or early April, for young only recently on the wing were taken in mid-May.

Plumage notes.—The juveniles are not described in Part 2 of Ridgway's *Birds of North and Middle America*. A female in pure juvenal plumage collected on Volcán de Santa Ana on May 15, 1927, is very similar to the adult female except that the throat and chin are yellowish green instead of buffy, the forehead is yellowish green and not chestnut, and the blue hood is indicated only as a dull, ill-defined, bluish green cap, not very different from the rest of the upperparts. A juvenal male collected at the same place and time has the upper throat and chin brownish orange (exactly as in adult females). The primaries and rectrices are black as in the adult male, but otherwise there is complete resemblance to the juvenile female described above.

There are no specimens showing the postjuvenal molt, but it seems likely that the full plumage follows it. At any rate, none of the eleven spring and summer males shows any transitional stage such as is worn by *lauta*.

***Tanagra lauta lauta* Bangs and Penard. BONAPARTE'S TANAGER.**

Tanagra lauta lauta Bangs and Penard, Bull. Mus. Comp. Zool., 63, p. 35, June, 1919—(new name for *Euphonia hirundinacea* Bonaparte, pre-occupied) Guatemala.

Specimens collected.—San Salvador, 1 (April 25, 1912); Chilata, 5 (April 24 to 29, 1927); Volcán de San Salvador, 1 (June 2, 1912); Zapotitán, 1 (June 11, 1912); Lake Guija, 1 (May 24, 1927).

Status.—Uncommon in spring and summer (and presumably resident) in the plateau and hill country of the western and south central departments. The vertical range is from 1,450 to 4,500 feet. Occurs in both Arid Lower and Humid Upper Tropical Zones (fig. 27).

Remarks.—Bonaparte's tanager is decidedly uncommon, even within its rather limited local range, and was encountered only casually. Curiously enough specimens were taken only during the spring and summer months, so possibly this species is migratory. All those met with except the San Salvador and Lake Guija specimens were members of pairs. The two from these localities were solitary.

The typical habitat is medium-height, thick-growing woods along barrancas and streams. An abundant supply of mistletoe berries is also necessary, for this species like other local members of the genus appears to subsist on them entirely. At Chilata, in the Balsam Range in the latter part of April, 1927, one or more pairs were seen daily in the trees growing on the steep banks of a rocky gorge. This was the only locality in which they were other than very rare.

Although not unlike *Tanagra affinis* in general appearance, the males of *lauta* may easily be distinguished in life by their yellow instead of black throats. As a field mark this will differentiate the two at long distances, in fact, almost as far as the birds can be seen.

Nesting.—The birds taken at Chilata in April although paired were not yet breeding. A female collected at Lake Guija on May 24, 1927, was ready to lay.

Plumage notes.—The young males of *lauta* do not attain the adult plumage the first year. They may be said to possess the underparts (although these are strongly washed with greenish) auriculars, foreheads, and crowns of adult males combined with the wings, tails, and upperparts of females. There are varying amounts of blue feathers in the crown and hindneck, most if not all of which are the result of a prenuptial molt. At least this is true in one specimen taken April 25. The three young males collected were all in breeding condition and two of them were accompanied by females.

Colors of soft parts.—Adult and one-year-old males: iris, dark brown; maxilla, black; mandible, gray-blue, tip, black; tarsi and feet, dark plumbeous.

Stomach contents.—Mistletoe berries exclusively.

Tanagra affinis Lesson. LESSON'S TANAGER.

Tanagra (Euphonia) affinis Lesson, Rev. Zool., p. 175, 1842—Realejo, Nicaragua.

Specimens collected.—Divisadero, 3; Lake Guija, 1; Rio San Miguel, 1; Puerto del Triunfo, 2; Lake Olomega, 4; Volcán de San Miguel, 4; Lake Channmico, 2; San Salvador, 3; Chilata, 5; Sonsonate, 4; Barra de Santiago, 2.

Status.—Common resident of the Arid Lower Tropical Zone. The vertical range is from sea level to 3,000 feet (fig. 27).

Remarks.—This beautiful little tanager is common and of general distribution throughout the lowlands and is the only representative

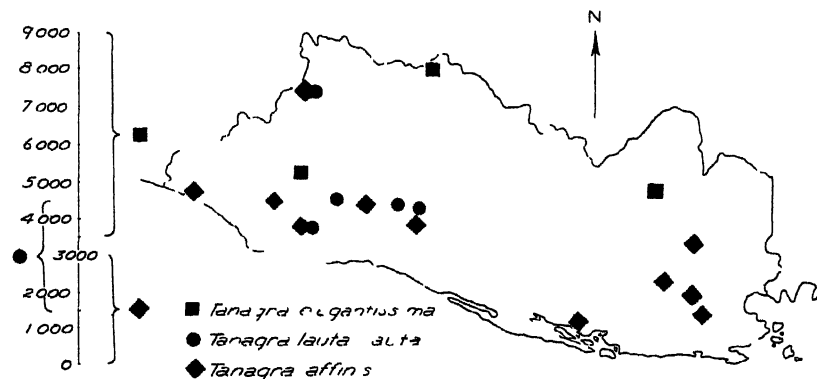


FIG. 27. Distribution of the tanagers of the genus *Tanagra* in El Salvador

of the genus to be found in the tierra caliente. Thus there is practically no competition between the three local representatives of *Tanagra*, for the present species centers in the lowlands, *lauta* occupies the hill country, and *elegantissima* is primarily a high mountain form. At certain places the vertical ranges of *affinis* and *lauta* overlap; in fact, both may be found together almost anywhere between the altitudes of 1,400 and 3,000 feet in the western departments, but where dual occupancy of a region occurs, *affinis* apparently is always the dominant form.

In appearance and call-notes Lesson's tanagers bear remarkable resemblance to goldfinches. Except for the chunkier appearance of the tanagers there is every possibility of mistaking the females for females of *Spinus psaltria* unless one is very close indeed, while, except for the reversal of the throat and forehead colors, there is practically nothing to distinguish in life the male tanagers from the

males of the local race (*croceus*) of *Spinus psaltria*. That such a close parallel in size and color exists between two members of separate families is remarkable enough, but when the resemblance extends still further, to call-notes, general habits, and even to the occurrence of the annual molt in summer instead of fall, it seems extraordinary. The chief point of difference so far as the ecology of the two species is concerned is in the food habits, for the goldfinch is primarily a seed-eater while the tanager subsists in the main on mistletoe berries.

Nesting.—Lesson's tanagers are found in pairs throughout the year, and nesting apparently is confined to no particular season. Birds taken in January, March, April, August, September, and October were certainly breeding. If there is any cessation of activity it is during the annual molt in midsummer. The more or less continuous breeding may well be a factor in the numerical dominance of *affinis* over *lauta* and *elegantissima*.

Plumage notes.—The annual molt takes place in June and July, and by the first week in August even the most tardy individuals are in complete new plumage. Birds of the year probably vary in time of the molt according to the time of hatching. For example, four young males collected in February, May, July, and September, respectively, are all in essentially the same stage of plumage, that is the postjuvenal body molt is complete, although the flight feathers are in varying degrees of renewal. The full adult plumage is assumed at the postjuvenal molt, a program in which *affinis* differs radically from *lauta*.

There is a good deal of variation in the amount of yellow on the head of the males, irrespective of age. In some it reaches barely to a line above the center of the eyes, in the majority it reaches to the posterior corner of the eye, while in others it extends backward considerably behind the eyes. The posterior outline may be concave, straight, or convex. In the specimen which exhibits the greatest amount of yellow, this color extends back laterally, in the form of broad and conspicuous supra-auricular stripes, nearly to the nape.

Colors of soft parts.—Adult males: iris, dark brown; maxilla, black with basal half (below nostrils) pale, delft blue; mandible, pale, delft blue, tip, black; tarsi and feet, plumbeous horn-color.

Stomach contents.—Almost invariably these birds are gorged with mistletoe berries. In addition three specimens contained berry seeds and fruit pulp other than mistletoe. At Puerto del Triunfo this species was a constant visitor to the oranges which had originally

been drilled open by *Centurus santacruzi*. This variation in diet was not observed in either of the other local species of *Tanagra*.

***Thraupis abbas* (Lichtenstein). ABBOT TANAGER.**

Tanagra abbas Lichtenstein, Preis-Verz. . . . Vog., Mex., p. 2, 1831—Mexico.

Specimens and records.—San Salvador, 12; Sonsonate, 3; Puerto del Triunfo, 2; San José del Sacare, 1; Divisadero, 2; Lake Guija, 1; Volcán de Santa Ana, 1; Mt. Cacaguatique, 1; Volcán de San Miguel, 1; Chilata, 1. Also noted at Lake Channmico; Volcán de San Salvador; San Sebastián; Ciudad Barrios.

Status.—Common resident of wooded areas throughout the Arid Lower Tropical Zone, reaching locally the fringes of the Arid Upper Tropical Zone and even the lower edge of the Humid Upper Tropical cloud forests on the coastal volcanoes. The vertical range is from sea level to 4,500 feet.

Remarks.—The series of abbot tanagers from El Salvador follows in some points the measurements recorded by Ridgway¹ for Guatemalan specimens. The wings of ten fully adult males range in length from 97 to 100 mm. and are thus, in this respect, fully as large as examples from Mexico. However, the tails are very short (62 to 66) and it seems not improbable that a southern form is capable of definition.

Although nowhere to be classed as abundant, these tanagers are fairly common nearly everywhere below an elevation of 4,500 feet. Heavy forest is avoided, but clearings, even of relatively small size, are likely to contain one or two pairs, especially if houses are present. At Puerto del Triunfo abbot tanagers were very common about the town and in the deserted orange and banana groves nearby, but were never seen in the adjacent forest. This preference for inhabited districts is characteristic of both *abbas* and, to a lesser extent, *diaconus*. Both species are without doubt to be numbered among the relatively few which have adapted themselves with advantage to radically altered conditions.

Pairs seem to be common at all seasons, and at most not more than three or four birds make up a flock during the winter months. This small number is not surprising in view of their quarrelsome disposition and, in fact, one might well wonder that even so small an assemblage as three or four would group together even temporarily.

¹ Bull. U. S. Nat. Mus., 50, pt. 2, p. 60, 1902.

The first thing which invariably happens when *abbas* arrive at a food tree is that all other visitors are promptly banished. Should other abbot or blue tanagers arrive while feeding is in progress, pitched battles which are no play affairs may ensue. An argument of this nature was witnessed at Puerto del Triunfo, the fight continuing until two of the participants, both females, were so exhausted that they were helpless and were caught by hand. A pair or trio, after feeding, usually resorts to the topmost branches of a taller, dead-topped tree where, chattering and scolding, they remain until the next assault on the food trees below. The call-notes are harsh, not unlike those of the English sparrow, a species with which, in some particulars of habits and disposition, these tanagers have a good deal in common.

Nesting.—A pair was seen carrying grass, cotton, rags, and other soft material into the crown of a tall coco palm at Chilata April 21, 1927. The nest was well concealed among the fronds for, although both birds worked intermittently for a week or more, not a sign of the nest was visible from below. The site was about thirty feet above the ground. Dissection of specimens showed that nesting begins in early March and lasts until early July.

Plumage notes.—Two years are required in which to attain maturity, at least this is true for the males and possible for the females also. The one-year-old males are not distinguishable with certainty from the adult females, but are usually a trifle larger in size. One-year-old males, although not mature as to plumage, are mature sexually.

The annual molt takes place very early and is finished by the end of July or the first week in August. One-year-old birds of both sexes have a spring molt (February and March) which involves the head, neck, chest, back, and sometimes some of the tertials. This molt is present in adults, but fewer feathers are replaced than in the young birds.

Colors of soft parts.—Adults: bill, black or plumbeous black; tarsi and feet, dark plumbeous or plumbeous black; iris, dark brown.

Stomach contents.—Small seeds, 1; seeds and insects, 1; small berries, 1. This species is notably fond of orange pulp and was a frequent visitor to such orange trees as had been previously raided by *Centurus*.

***Thraupis cana diaconus* (Lesson). NORTHERN BLUE TANAGER.**

Tanagra (Aglaia) diaconus Lesson, Rev. Zool., 5, p. 175, June, 1842—Realejo, Nicaragua.

Tanagra cana diaconus Miller, Condor, 34, p. 16, January, 1932—Sonsonate (nesting).

Specimens and records.—Sonsonate, 2; San Salvador, 5; Puerto del Triunfo, 1; Lake Olomega, 3; Divisadero, 1. Also noted at Lake Channmico; Volcán de San Salvador; San Sebastián; Ciudad Barrios; Chilata; Volcán de Santa Ana. Recorded from Sonsonate.

Status.—Uncommon resident of the Arid Lower Tropical Zone, locally invading the lower edges of both the Arid and Humid Upper Tropical Zones. The vertical range is from sea level to 4,500 feet.

Remarks.—The local ranges of the abbot and blue tanagers are identical. They occurred together nearly everywhere, and the general habits of the two were very similar, but in relative numbers, *diaconus* in most localities was very much in the minority. For this reason, as well as from the fact that it usually stayed in foliage and did not so frequently perch in dead-topped trees, it was more likely to be overlooked. The only places in which *diaconus* seemed to be on a parity with *abbas* were Puerto del Triunfo and about the buildings on the coffee finca of Granadillas on Volcán de San Salvador. These two places, oddly enough, represent the extremes of altitude in the local range of the species.

Nesting.—Miller (sup. cit.) records a nest found at Sonsonate which was built about twenty-five feet from the ground in a royal (coco) palm. This was loosely constructed of shredded palm bark and a little hair. When collected on July 18, 1925, it contained a complete set of two eggs which were dull white, rather evenly spotted with dark brown.

Plumage notes.—The series does not indicate whether or not maturity is reached the first year. The annual molt certainly takes place later than in *abbas*, for it has only commenced in two birds taken July 12 and 16, and is by no means complete in two others taken August 24 and 31. This is about a month later than *abbas*, which is generally finished with the annual molt by the end of July. The spring molt, which is very limited, is also decidedly later than that of *abbas* and does not occur before the latter part of March or the middle of April.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; maxilla, black with tomia, basally, light blue; mandible, pale, plumbeous blue, tip, black; tarsi and feet, dark, plumbeous blue. Juvenile female: maxilla and iris, dark brown; mandible, bluish horn-color, tip, black; tarsi and feet, plumbeous blue.

Stomach contents.—Fruit pulp, 2; lantana seeds, 1; caterpillars, 1. Also observed eating orange pulp from opened fruit.

Piranga leucoptera leucoptera Trudeau. WHITE-WINGED
TANAGER.

Piranga leucoptera Trudeau, Journ. Acad. Nat. Sci. Phila., 8, p. 160, 1889—Mexico; Berlepsch, Verh. 5th Int. Orn. Kong., p. 1065, 1910—San Salvador.

Piranga leucoptera leucoptera Ridgway, Bull. U. S. Nat. Mus., 50, pt. 2, p. 99, 1902—San Salvador (crit.).

Specimens and records.—Mt. Cacaguatique, 9 (November 24 to December 21, 1925); Volcán de Santa Ana, 3 (May 5, 13, 1927); Zapotitán, 1 (June 29, 1912); Hacienda Chilata, 9 (April 22 to 29, 1927). Recorded from San Salvador.

Status.—Uncommon resident of the higher portions of the Arid Lower Tropical and lower fringes of the Arid and Humid Upper Tropical Zones. The vertical range is from 1,500 to 5,000 feet.

Remarks.—The above series is so uniformly intermediate in color and markings between typical *leucoptera* and *P. l. latifasciata* that one could refer the specimens to either race without very much violence to the facts. On the other hand they are slightly, but definitely, larger than either. The nine adult males have the following measurements: wing, 71–76 (73); tail, 58–64 (60.4); exposed culmen, 12.7–14 (13.5); depth of bill at base, 7.7–8.6 (8.1). It is possible that a demonstrable race exists on the Pacific coast of Central America.

Bar-winged tanagers were never common, even in the favored localities of Mt. Cacaguatique and Chilata, and the specimens listed above were all which were secured during our field work. On Mt. Cacaguatique only a few were seen in the coffee cover, the majority being taken in the oaks and pines of the Arid Upper Tropical Zone. However, as none were found in the oak-pine association about San José del Sacare, or indeed at any place in the interior mountains other than Mt. Cacaguatique, it is probable that on this mountain they were simply temporarily attracted by the very abundant supply of mistletoe berries. The upper edge of the Arid Lower Tropical Zone appears to be the true habitat. On Volcán de Santa Ana three birds were found in the more open growth at the lower edge of the cloud forest. This locality was, by some 1,500 feet elevation, the highest record for the species.

These tanagers were dwellers of the upper foliage and very seldom came lower than thirty feet from the ground. They were noted as

entirely solitary during the winter months and either solitary or in pairs in the breeding season.

Nesting.—Specimens taken at Chilata in late April and on Volcán de Santa Ana in early May were obviously breeding.

Plumage notes.—First-winter males are very similar to adults of the same sex, but the wing and tail feathers are more rusty, duller black, and usually edged with slaty olive. The measurements are also somewhat less than in adults, for the wings measure only 66 to 71 mm. and the tails from 57 to 61. The body plumage of these young birds has a paler and more orange hue, and in four out of the five cases there are small patches of orange-tinted feathers here and there on the underparts. Whether the wing and tail feathers are remnants of the juvenal plumage, or whether they are acquired along with the postjuvenal body plumage, there are no specimens to show. The analogy of other species in the genus *Piranga* would indicate that they are juvenal feathers.

Colors of soft parts.—Adults, sexes alike: iris, dark brown; maxilla, blackish plumbeous; mandible, plumbeous, tip darker; tarsi and feet, bright, plumbeous blue. First-winter female: similar, but plumbeous of bill, tarsi and feet, paler and tinged with brown or horn color.

***Piranga ludoviciana* (Wilson). WESTERN Tanager.**

Tanager ludoviciana Wilson, Amer. Orn., 3, p. 27, pl. 20, fig. 1, 1811—near mouth of Lolo Creek Fork, Clearwater River, Idaho.

Specimens and records.—Mt. Cacaguate, 8 (November 20 to December 15, 1925); Puerto del Triunfo, 1 (January 13, 1926); Rio San Miguel, 1 (February 19, 1926); Volcán de Conchagua, 1 (March 1, 1926); Volcán de San Miguel, 1 (March 14, 1926); San Salvador, 2 (April 1, 4, 1912); Chilata, 1 (April 23, 1927). Also noted at Divisadero (November 12, 1925); Colima (January 21, 1927).

Status.—Common, at times even abundant, winter visitant everywhere in the Arid Lower Tropical Zone and locally in adjacent parts of the oak and pine regions. Found from sea level to 3,500 feet. Dates of arrival and departure are November 12 and April 23.

Remarks.—It was rather surprising to find western tanagers wintering so commonly nearly 200 miles south of the southernmost point from which they were previously known. The first arrivals to be detected were two old males which were seen in the mimosa thickets at Divisadero November 12, 1925. No more were observed until collecting was started on Mt. Cacaguate November 20, 1925, when the species was found to be extremely common everywhere

through the coffee and also in the pines and oaks a few hundred feet higher. From the latter part of December until the middle of February, western tanagers were generally distributed everywhere over the lowlands, but later on were again found only above 2,000 feet. The impression in the field was that they arrived via the highlands, that part of the population spread out over the lowlands during the winter and then retired again to the hills for the short period remaining before the northward flight. At any rate, none was seen at any locality below 2,000 feet after February 19, though there were plenty of birds above that level for over two months longer. There were no marked migrations at any time. The departure was a gradual one with ever-decreasing numbers in evidence after April 1. The last individual noted was taken at Chilata April 23, 1927.

Plumage notes.—The prenuptial molt of both adult and first spring males takes place between mid-February and late April. In the old males it is confined (two spring birds only) to the head, neck, and upper chest. In four young males the molt is much more extensive and includes practically the whole of the contour plumage (including wing coverts and tertials) of the anterior two-thirds of the body. In *ludoviciana*, as is apparently the case with nearly or quite all members of the genus *Piranga*, the greenish, juvenal remiges and rectrices are carried until the first postnuptial (second fall) molt. It is noticeable that in a long spring and summer series of both one-year-old and adult male *ludoviciana* the red of the head averages very much less intense and is less extensive than in adults.

***Piranga bidentata sanguinolenta* Lafresnaye. LAFRESNAYE'S
TANAGER.**

Piranga sanguinolenta Lafresnaye, Rev. Zool., p. 97, 1839—Mexico.

Specimens collected.—Mt. Cacaguatique, 11 (November 21 to December 21, 1925); Los Esesmiles, 1 (February 10, 1927); Volcán de Santa Ana, 2 (May 14, 17, 1927).

Status.—Uncommon resident of the oak regions of the cordillera and Volcán de Santa Ana, extending casually into the more open portions of the Humid Upper Tropical cloud forest and into the higher portions of the Arid Lower Tropical Zone. The vertical range is from 3,500 to 8,000 feet.

Remarks.—In only one locality was Lafresnaye's tanager found to be even moderately common. During the winter of 1925 the mistletoe in the extensive oak groves on Mt. Cacaguatique bore an exceptionally heavy crop of berries, and this was undoubtedly the cause of

the temporary local abundance of this as well as many other species. Outside of this region only three specimens were taken, one in the oaks at the edge of the cloud forest on Los Esesmites, and two (one in a cypress grove, the other in oaks) on Volcán de Santa Ana.

In every respect this seems to be a typical *Piranga*. The liquid call-notes are almost identical with those of *ludoviciana* and *rubra*. Although single birds were the rule during the winter, two or three were occasionally found together.

Nesting.—The two birds taken on Volcán de Santa Ana in mid-May were certainly breeding at the time.

Plumage notes.—It is obvious from a perusal of Zimmer's data on the molts of *Piranga flava* and his comment about some other species as well, that the last word has not been said regarding the molt programs of the several species in this genus. In view of the relatively few specimens of *sanguinolenta* which are available for study, it would be unsafe to make any positive generalities.

To begin with, there are three males in complete postjuvénal plumage taken on November 21, November 25, and December 17, respectively. All were certainly birds of the year as shown conclusively by the "windows" in the skulls. These three are surprisingly uniform in appearance. They have retained the juvenal remiges and rectrices except that one has replaced one lateral rectrix with an adult feather. The body plumage is essentially like that of the female, but the head and underparts are variegated with small, ill-defined patches of orange-red and yellow.

Three red males taken at the same time of year (midwinter) were certainly adult; that is, they had passed through at least one breeding season, for the skulls showed no trace of fontanelles. They, as well as the three spring and summer red males (a total of six), are almost exactly alike, and not one has a single green or yellow feather anywhere.

The females seem subject to relatively little color change once the postjuvénal plumage is attained. One bird of the year taken November 26 has sharp, black shaft streaks on the feathers across the pectoral region, but the other is not distinguishable from the three adults.

Colors of soft parts.—Adult (red) males: iris, dark brown; maxilla, blackish brown; mandible, plumbeous blue, tip, dusky; tarsi and feet, brownish plumbeous. First-winter males and first-winter females:

similar, but mandible lilaceous flesh-color. Adult females were not recorded.

Piranga rubra rubra (Linnaeus). SUMMER TANAGER. CARDINAL.

Fringilla rubra Linnaeus, Syst. Nat., ed. 10, 1, p. 181, 1758—South Carolina.

Specimens and records.—Monte Mayor, 2 (October 6, 8, 1925); Divisadero, 5 (October 13 to November 13, 1925); Rio Goascorán, 1 (October 25, 1925); Mt. Cacaguate, 6 (November 22 to December 4, 1925); Puerto del Triunfo, 2 (January 7, 13, 1926); Volcán de San Miguel, 2 (March 16, 17, 1926). Also noted at Lake Olomega (October 30, 1925).

Status.—Common in the fall, winter, and spring of 1925–1926 throughout the Arid Lower Tropical Zone east of the Lempa River; not detected anywhere in El Salvador before or since. Dates of arrival and departure were October 6 and March 17.

Remarks.—There seems no plausible explanation for the fact that from October 6, 1925 to March 17, 1926 summer tanagers were fairly common throughout the Oriente, while during the winter and spring seasons of 1912 and 1927 not one individual was found anywhere in the central and western departments. The only two hypotheses which can be advanced are that the winter range in El Salvador is confined to the Oriente, which would seem to be almost incredible in the case of this wide-ranging species, or else that *rubra* occurs sporadically and only during certain years.

In 1925 and 1926 summer tanagers were found to be generally distributed in all wooded and semi-wooded localities from sea level to at least 3,500 feet. The manner of occurrence was always as single birds, never as flocks or even pairs.

Plumage notes.—All of the red adult males are regular in every respect. Ten examples were collected, but not one shows any plumage abnormality such as green replacement feathers. Three young males, taken November 12, January 13, and March 17, show red feathers replacing green ones even at these early dates. There can be no question that this is the normal sequence.

In the case of abnormalities such as the replacement of red feathers by yellow or green ones, the primaries seemingly provide an unfailing clue to age. In no instance have we seen in any species of tanager the replacement of red primaries by the immature or greenish type, although such reversal in other portions of the plumage, even of the rectrices and secondaries, has been the cause of some speculation. This reversal is evident in any considerable series of *rubra*

or its western race *cooperi*. Its cause has yet to be determined but, as previously stated, there need be no confusion as to whether a part-colored individual represents a normal transition or an abnormal reversal if the primary quills are taken as guide. If red, the bird is adult; if green, it is immature, regardless of the condition or color of other portions of the plumage.

***Piranga flava albifacies* Zimmer. EL SALVADOR RED TANAGER.**

Piranga flava albifacies Zimmer, Field Mus. Nat. Hist., Zool. Ser., 17, no. 5, p. 205, 1929—San José del Sacare, Chalatenango, El Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 379, 1932—Salvador (crit.).

Specimens collected.—Mt. Cacaguatique, 8 (November 21 to December 6, 1925); San José del Sacare, 10 (March 12 to 17, 1927).

Status.—Fairly common resident of the Arid Upper Tropical oak-pine association along the cordillera. The vertical range is extremely narrow, for all specimens were taken between 3,500 and 3,600 feet.

Remarks.—The characters of this race, as compared with *Piranga flava figlina* of the Atlantic lowlands of Honduras, Nicaragua, and Guatemala, are larger size, whiter sides of head and, in the old males, deeper and redder coloration. Zimmer's average measurements for *albifacies*, based largely on the series from El Salvador, are as follows:

	Wing	Tail	Exposed Culmen	Tarsus
Males.....	98.7	78.3	18.4	22
Females.....	93.7	76.5	17.8	21.7

Young males, that is, those birds with yellow-green primaries, are smaller than adults of the same sex and are almost exactly the size of females.

The range of *albifacies* is now known to include the highlands of western Guatemala and northern Nicaragua, and probably will be found to include the mountains of interior and southern Honduras. However, this form is apparently so restricted as to altitude and associational requirements that the distribution will undoubtedly prove to be extremely spotty.

On Mt. Cacaguatique *albifacies* was found only in the oaks and pines adjacent to the upper limits of the Arid Lower Tropical Zone. Occasional birds straggled into the fringes of coffee, but such occurrence was sporadic. At San José del Sacare there was a fair number of birds scattered in pairs through a rolling prairie country cut with ravines and grown more or less thickly with pines and deciduous oaks. To this area of perhaps ten square miles the tanagers seemed to be

strictly confined, for not one was found elsewhere, even in seemingly identical country.

Nesting.—The specimens collected at San José del Sacare were in pairs (during the winter months flocks of four or five had been the rule), and it was evident, although nesting had not yet commenced, that the breeding season was not far distant.

Plumage notes.—Three males of the year collected on Mt. Cacaguatique November 21 and December 4, 1925, are exactly like the females in color. There is no question as to the age of these birds, for the skulls showed the "windowed" condition as in most young Passeriformes. In all North American forms of *Piranga flava* (we have seen no South American birds) this plumage is worn, usually without change, until the following fall. As they breed in this plumage, it need cause no concern to find breeding males in the female type of plumage. The only young male of *albifacies* collected in spring has a few scattered, orange-red feathers on the forehead and underparts. Since these are obviously newer and less abraded than the yellow-green ones, they have necessarily been acquired subsequent to the postjuvenal molt of the previous winter. However, this is probably exceptional, for none of the young males of the northwestern form, *oreophasma*, of which we have seen a great number, show any change whatever from the previous fall. One of the adult (red) males shows a few scattered yellow or orange feathers about the head—the only one of the six specimens of that age to do so. Zimmer is undoubtedly correct in saying that *flava* normally has but one regular molt a year.

Colors of soft parts.—Adult males and females: iris, dark brown; maxilla, brownish black; mandible, plumbeous; tarsi and feet, slaty horn-color. Males and females, first winter: similar, but mandible, tarsi and feet, more brownish and less plumbeous.

***Habia rubica salvadorensis* Dickey and van Rossem. EL SALVADOR ANT Tanager.**

Habia rubica salvadorensis Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 4, January 8, 1927—Mt. Cacaguatique, Dept. San Miguel, El Salvador (and other localities listed below); Griscom, Occ. Papers Bost. Soc. Nat. Hist., 5, pp. 289, 291, June 14, 1930—Salvador; Bull. Amer. Mus. Nat. Hist., 64, p. 382, 1932—Salvador.

Specimens collected.—Mt. Cacaguatique, 10; Lake Olomega, 4; Chilata, 2; Puerto del Triunfo, 4; Volcán de Santa Ana, 1; Volcán de Conchagua, 2; Volcán de Sociedad, 1; Volcán de San Miguel, 1.

Status.—Fairly common resident of denser undergrowth below an elevation of 5,000 feet. Although occurring in the Arid Lower Tropical Zone and both Arid and Humid Upper Tropical Zones, the species is perhaps most common at the junction of Arid Lower Tropical and Arid Upper Tropical at an altitude of 3,000 to 3,500 feet.

Remarks.—The distribution of *salvadorensis* seems to be general from sea level at least to 5,000 feet coastwise, and to some 4,000 feet in the interior. It was found in the huiscoyol palm thickets on the coastal plain (where it mingled intimately with *Habia salvinii wetmorei*), in the undergrowth about Lake Olomega, in coffee groves at Chilata, and along wooded ravines everywhere in the hill country. On Mt. Cacaguatique and on Volcán de San Miguel flocks were observed in all sorts of associations, the one indispensable element being plenty of low, leafy scrub. In both of these last localities fully as many were found in the oaks as in other growth; in fact, the greater part were noted at about 3,000 or 3,500 feet where the Arid Upper Tropical and Lower Tropical growth mingled. A few birds were seen in the cloud forest on Volcán de Santa Ana at 5,000 feet, an elevation which is probably close to the upward limit reached by the species, at least locally.

These tanagers are gregarious and travel through the undergrowth in flocks numbering up to a dozen. They are noisy in the extreme, the harsh notes reminding one of a scolding wren, except that they are louder. Squeaking will drive a flock almost frantic with excitement, but nevertheless they are adepts at concealment and usually manage to keep a screen of foliage between themselves and danger.

The name "ant tanager" is less applicable to this species than to the next, although every foraging army of ants is pretty certain to have a flock working along at the head of the column.

Nesting.—Specimens taken from mid-April to mid-August were all in breeding condition.

Plumage notes.—The irregularities of plumage shown by *Habia* parallel in most respects those frequently seen in *Piranga*. Peters (Bull. Mus. Comp. Zool., 69, 1929) raises the question as to whether *Habia* may not have a complete seasonal change of plumage. This can be answered emphatically in the negative, insofar as *rubica* and *salvini* are concerned. Once the males have become red, they remain so except for such sporadic and irregular eruptions of green feathers as may appear on any portion of the body. These are usually, if not

invariably, synchronous with the renewal of sexual activity in the spring, a fact which is possibly of some significance. *Habia* has but one regular molt a year, varying somewhat in its inception, but roughly covering the period between August 1 and October 1.

Three postjuvénal males whose age and sex are unquestionable, are not distinguishable from adult females. They were collected respectively on October 7, December 16, and January 4. None show any trace of red feathers. The juvenal rectrices and remiges have been retained complete. There are no specimens of *salvadorensis* showing the step from green to red, but we have a male of *Habia rubica alfaroana* which (July 25) is in complete first postnuptial molt and which is replacing the green plumage of the first year by the normal, red, adult feathers.

Once the red plumage has been attained, there often occur curious reversals of color, that is, a reversion to the green type either as scattered feathers or even of definite areas. When these green reversals occur in the tail, the new (green) feathers are shorter and narrower than the red ones. This may not always be the case, but certainly it is so in the score or more *rubica*, *salvini*, and *alfaroana* which we have seen. Thus the phenomenon would appear to go deeper than a mere change of color, for such reversals approximate in shape and size as well as in color the corresponding feathers in the female.

Three postjuvénal females have the crown patch duller and more restricted and the throat duller than adults, but are not otherwise distinguishable except, of course, by the juvenal remiges and rectrices. One of these postjuveniles has molted the juvenal remiges, but retained the rectrices. Two of the five adult females have the remiges and rectrices a dull "cinnamon rufous" instead of olive-green, thus indicating two color phases in that sex.

Colors of soft parts.—Adult males: iris, dark brown; bill, black, blackish plumbeous, or brownish black; tarsi and feet, dark brown. Adult females: iris, dark brown; bill, dark brown to brownish black, the mandible varying from concolor with the maxilla to pale dull brown; tarsi and feet, varying from pale yellowish olive to dark brown. Postjuvénal male: similar to adult, but mandible usually paler than maxilla. Postjuvénal female: similar to adult female, but mandible dusky flesh-color.

Stomach contents.—Small berries exclusively, 1; berries and insects, 1.

Habia salvini wetmorei Dickey and van Rossem. WETMORE'S
ANT Tanager.

Habia salvini wetmorei Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 5, January 8, 1927—Puerto del Triunfo (and localities listed below), El Salvador.

Specimens collected.—Puerto del Triunfo, 12; Lake Olomega, 3; Rio San Miguel, 6; Miraflores, 3; Zapotitán, 1; Colima, 1; Barra de Santiago, 3; Volcán de San Miguel, 2.

Status.—Common resident of undergrowth in the lowlands, principally in the huiscoyol (*Bactris subglobosa*) association, but straggling casually to an elevation of 2,500 feet.

Remarks.—The distribution of Wetmore's ant tanager was almost exactly coincident with that of the huiscoyol palm growth (pl. XVIII). As this plant grew most abundantly in swampy areas in the lowlands, it naturally follows that these tanagers were decidedly more numerous in such localities than where the huiscoyol was sparse and scattered. A very exceptional circumstance was the taking of two birds in the undergrowth of a ravine at 2,500 feet in Volcán de San Miguel. Both were birds of the previous year, and no doubt had wandered from the lower country. One was solitary, the other with a flock of *Habia rubica salvadorensis*. The two species often occur together in the same flocks in the lowlands, and these two *wetmorei* probably had simply followed wandering bands of *salvadorensis* to levels far above the normal range. The dates on which they were collected, March 17 and 20, 1926, were far in advance of the breeding season. At Zapotitán (1,500 feet) *wetmorei* was not uncommon in the swamp forest which occupied the lower part of the valley. This was by far the highest elevation where the species was found to be common, and its relative abundance there was without doubt due to the presence of extensive huiscoyol thickets. A single specimen taken January 21, 1927 at Colima (1,000 feet) in the valley of the Lempa was the only record for the interior. Like the Volcán de San Miguel records, this last specimen was immature and was probably a vagrant.

The coastal plain is the real home of the subspecies, and there it was at times almost abundant, wandering through the nearly impenetrable palm thickets in small, noisy flocks. In appearance in life, habits, and call-notes there seemed to be little or nothing by which to distinguish *wetmorei* and *salvadorensis*. The two often travel about in mixed flocks, and until one has a bird in hand it is usually not possible to tell which form is under observation. If there is any

difference in general habits, it is that *wetmorei* more often and more persistently follows, or rather precedes, the march of a column of army ants.

Nesting.—In June, 1912, two nests were found at Zapotitán. The first, discovered on June 27, was in a small, slender bush growing in a bog in the swamp forest. This nest was loosely made of plant and weed stems, and had a lining of fine grass and inner bark-strips. It was placed in a triple crotch, about four feet above the mud and plainly visible from some distance. The two eggs were immaculate white. On the 28th another nest was found in the same area of swamp forest. In this case the nest, although of construction similar to the first, was packed in against a dead stub and was concealed, as well as supported, by the coiling stems of a parasitic creeper. Had the female not flushed it would have escaped notice. The three eggs, like those in the first nest, were pure white. These eggs are not now available for measurement.

Plumage notes.—The remarks on the sequence of plumage of *Habia rubica salvadorensis* apply equally to the present species. The body plumage of three postjuvénal females collected January 21, February 6, and March 20, is not distinguishable from adult females of the yellow-throated, and presumably more primitive, phase except that there is scarcely a trace of concealed color on the crown. The juvenal rectrices and remiges are, of course, shorter, and the former more pointed. In the adult females there are two distinct color phases—a yellow or orange-throated one and also a salmon-throated one which is relatively rare. Two out of the ten adult females collected were of this latter type. In addition to the salmon throat the whole plumage has, as compared to the commoner type, a decided reddish cast. One of these two specimens was accidentally destroyed in the field.

In the postjuvénal males the same dichromatism is evident, although the percentages in this sex seem to be about equal. Of the five examples of this age and sex, two are salmon-throated, two are yellow-throated, and in the fifth the two colors are mixed. The body plumage of the salmon-throated young males is slightly more ruddy than that of the yellow-throated birds of the same sex, but the wings and tails are all alike and resemble those of the yellow-throated females; that is, they are olive green with no reddish tints.

Adult males not infrequently show the same sort of color reversal in isolated body feathers observed in *rubica* and some species of *Piranga*. In the entire series of 31 skins taken at all seasons of the year,

only one bird shows the approximate time of the annual molt. This is an adult male, taken August 20, 1925, which is molting from red to red over the entire body, wings, and tail.

Color of soft parts.—Adults and midwinter postjuveniles alike: iris, dark brown; bill, brownish black (edge of gape dull yellow in females and young); tarsi and feet, light, reddish brown.

***Chlorospingus ophthalmicus honduratus* Berlepsch. GRAY-HEADED BUSH TANAGER.**

Chlorospingus honduratus Berlepsch, Verh. 5th Int. Orn. Kong., p. 1088, 1910—Volcán de Pucá, Honduras.

Chlorospingus schistaceiceps Dickey and van Rossem, Proc. Biol. Soc. Wash., 41, p. 190, October 15, 1928—Los Esesmiles, Chalatenango, El Salvador; Griscom, Bull. Amer. Mus. Nat. Hist., 64, p. 385, 1932—in text, Salvador (crit.).

Specimens collected.—Los Esesmiles, 19 (February 2 to March 5, 1927).

Status.—Exceedingly common resident of brushy areas in the Humid Upper Tropical cloud forest of the cordillera. The vertical range is from 7,000 to 8,700 feet.

Remarks.—At the time the writers described *schistaceiceps*, they did not compare the El Salvador series with *honduratus* since the latter was described as having the pileum *pale brown*. Hellmayr, who has examined not only the type, but also Count Berlepsch's original manuscript notes, tells us that the author intended to describe the Honduras bird as *gray-headed* and that the term "brunneo" is a typographical error. This being the case, *schistaceiceps* falls as a synonym of *honduratus*. In this connection it may be remarked that Griscom states that his northern Nicaragua birds are definitely more brown-headed than examples of "*schistaceiceps*" [*honduratus*] which we sent him for comparison. Since Griscom, like ourselves, was misled by the descriptive error (he considered his brown-headed birds to be *honduratus*), it follows that the Nicaraguan bird, a connecting link between *C. honduratus* and *C. novicius regionalis*, will probably require a new name.

The habitat of this tanager is the denser undergrowth of the Los Esesmiles cloud forest, particularly about the edges of clearings, along trails, and the scrub of second growth. Through such thickets it moves in noisy, chattering flocks of a dozen or more, the members in such constant motion that specimens usually can be taken only by quick snap shots. Altogether one has the impression that *Chlorospingus* is an active, hustling sparrow rather than a tanager.

In point of numbers this was one of the commonest birds on Los Esesmites, and on every excursion into the cloud forest a dozen or more flocks were met. The staccato alarm notes, voiced continually whenever a strange object is seen, at times proved to be a decided handicap when more desirable species were being hunted. The flocks were rapidly breaking up into pairs by the first week in March, which circumstance, combined with the rapid enlargement of the sex organs, showed that the breeding season was rapidly drawing near.

Colors of soft parts.—Adults, sexes alike: iris, reddish brown or brownish red; bill, plumbeous black; tarsi and feet, plumbeous horn-color.

Family FRINGILLIDAE. Grosbeaks, Finches, Sparrows,
and Buntings

***Saltator atriceps atriceps* (Lesson). BLACK-HEADED SALTATOR.**

Tanagra (Saltator) atriceps Lesson, Cent. Zool., p. 208, pl. 69, 1830—Mexico.
Saltator atriceps atriceps Miller, Condor, 34, p. 17, January, 1932—Sonsonate (nesting).

Specimens and records.—Mt. Cacaguatique, 3; Lake Olomega, 3; Sonsonate, 4; Divisadero, 2; Puerto del Triunfo, 1; San Salvador, 3; Lake Guija, 1; Chilata, 1. Also noted at Rio San Miguel; Colima; La Palma; San José del Sacare; Barra de Santiago; Volcán de Santa Ana.

Status.—Common resident of the Arid Lower Tropical Zone, locally reaching both the Arid and the Humid Upper Tropical. Noted nearly everywhere from sea level to 4,500 feet.

Remarks.—Except for its larger size, one of the specimens is indistinguishable from the average of *Saltator atriceps lacterosus* of Costa Rica and Panama. From this pale extreme there is exhibited every variation up to typical *atriceps* with a broad, well-defined pectoral band of black. There appears to be a large amount of individual variation in typical *atriceps*, and the variation in the El Salvador series does not necessarily indicate intergradation with *lacterosus*.

While the two local species of *Saltator* range over much the same territory, they are rather sharply divided ecologically. The smaller *grandis* is essentially a bird of the undergrowth, the edges of clearings, and brushland in general. On the other hand *atriceps* roves through the treetops, and only under exceptional circumstances was it found at a height of less than thirty feet from the ground. During most of the year *atriceps* travels in small, noisy flocks whose presence it is impossible to overlook.

Nesting.—Adults seem to be in the breeding condition over a long period of the year, for only from November to February was there a temporary cessation of activity. Birds in pure juvenal plumage were taken on July 11 and November 30. Miller (sup. cit.) found a nest containing two eggs at Sonsonate on July 16, 1925, and another at the same place on July 15, containing large young. The first was in a tangle of vines hanging from a tree in a canyon bottom; it was built of tendrils and was well-cupped. The eggs were pale greenish blue, boldly scrawled with black about the larger end.

Plumage notes.—The postjuveniles differ from the adults only in the pale-colored or parti-colored mandible and in the shorter and less firm remiges and rectrices, the latter being worn until the first annual molt when the birds are over a year old. There seems to be but one molt a year, which occurs in August and September and is complete by the middle of October.

Colors of soft parts.—Adults, sexes alike: iris, brownish red or reddish brown; bill, black; tarsi and feet, dark horn-color. Juveniles: similar to adults, but iris brown and mandible and tip of maxilla dingy, yellowish flesh-color.

Stomach contents.—Fruit and berries, 2. Most birds are more or less stained with fruit juices when taken.

***Saltator grandis hesperis* Griscom. PACIFIC SALTATOR.**

Saltator grandis hesperis Griscom, Amer. Mus. Novit., 438, p. 8, December 15, 1930—San José, Guatemala; van Rossem, Trans. San Diego Soc. Nat. Hist., 7, no. 3, p. 21, October 6, 1931—El Salvador (crit.).

Specimens and records.—Sonsonate, 4; Divisadero, 1; Lake Olomega, 5; Rio San Miguel, 3; Lake Guija, 1; Lake Chanmico, 1; San Salvador, 5; Puerto del Triunfo, 1. Also noted at Colima; Barra de Santiago; Chilata.

Status.—Fairly common resident of brushy country and undergrowth everywhere in the Lower Tropical and, locally, in the Upper Tropical Zones. The vertical range of *hesperis* is from sea level to at least 4,500 feet.

Remarks.—This race, which occurs on the Pacific coast of Guatemala, El Salvador, and Nicaragua, differs from typical *grandis* of the Atlantic slope in its darker and grayer coloration and shorter superciliary streak. In the matter of size we doubt that there are any differences which will serve to distinguish the two. The eight adult males in the El Salvador series have wing measurements from 102 to 107.5 mm. and tail measurements varying from 101.5 to 111.

The Pacific saltator, although common and generally distributed in the lowlands, is a much less conspicuous species than the boldly colored, black-headed saltator which occurs over much the same local range. In addition to its dull, neutral-toned plumage and decidedly less gregarious habits, *hesperis*, as compared with its larger relative, was usually found close to the ground in thickets and about the edges of clearings where cover was low-growing and relatively dense. For this reason such localities as Divisadero and other closely settled districts were likely to harbor a larger percentage of *hesperis*, while in wooded areas *atriceps* was usually the commoner of the two.

Nesting.—A nest found at Lake Chanmico on June 6, 1912, was about three feet from the ground and nearly concealed, not only by the foliage of the mimosa bush in which it was placed, but by the leaves of trailing vines with which the bush was all but covered. The nest was flimsily built of rootlets and a little soft bark. The two eggs which were nearly hatched were described in the day's notes as rather larger, but of the same shape as those of a California towhee, with the ground color robin's-egg blue, marked with about a dozen irregularly scattered spots of jet black in the form of commas, dots, and scrawls.

Plumage notes.—The postjuvenile plumage is very different from the adult plumage and is, for the most part, olive-green instead of gray. Just how long this plumage persists is problematical, but it is probably only transient. An immature male taken January 18 had already begun the molt (probably the first prenuptial) into the gray plumage of maturity. In some specimens there is a heavy spring molt of the foreparts of the body while others appear to have no molt at all at that season. The annual molt takes place from August to October.

Colors of soft parts.—Adults: iris, brown; bill, plumbeous brown, mandible, slightly paler; tarsi and feet, plumbeous horn-color. Juveniles: similar, but maxilla dark brown; mandible, dull brown at base, terminal third, bluish flesh-color.

Buarremon brunneinuchus brunneinuchus (Lafresnaye).

MEXICAN CHESTNUT-CAPPED SPARROW.

Embernagra brunneinucha Lafresnaye, Rev. Zool., p. 97, 1839—Mexico.

Specimens collected.—Mt. Cacagutique, 2 (December 7, 8, 1925); Los Esesmls, 10 (February 6 to March 5, 1927).

Status.—Fairly common in winter and spring in the Humid Upper Tropical Zone of the cordillera. Breeds and is probably permanently resident. The vertical range is from 3,500 to 9,000 feet.

Remarks.—The typical habitat of the chestnut-capped sparrow is dense undergrowth bordering the edges of open spaces in the cloud forest. In such an environment numerous individuals were met with on Los Esesmiles, where they ranged clear to the summit. One is usually first made aware of their presence by the loud, sharp, rapidly uttered alarm notes. The clatter may be kept up at intervals as long as one is in the immediate vicinity of one of the small flocks in which this species is usually found. However, it is only rarely that a sight is obtained of the birds themselves, for by nature they keep close to or on the ground and well screened by foliage. The well-known expedient of "squeaking" will drive these birds almost frantic with excitement, and then specimens may easily be taken as they peer out here and there to get a better view. On the arid south slopes of Los Esesmiles a few of these sparrows were to be found in the fern bracken under the pines, usually along some small ravine or watercourse where the growth was thickest. The oaks on Mt. Cacagatique probably mark the lower limit of the vertical range. In that locality a few birds were found in a heavy fern growth in one of the steeper canyons, but the species was much less common than on Los Esesmiles.

The range extends only through the interior mountains, for on none of the coastal peaks was any trace of the birds to be found. Salvin and Godman found the species common on Volcán de Fuego in Guatemala, so it evidently does occur at times on mountains other than the central highlands.

Nesting.—Specimens taken on Los Esesmiles as late as March 5 were sexually quite dormant. A family of fully grown juveniles still accompanied by the parents was found on Mt. Cacagatique December 8. This is probably an abnormally late date, for a good series of specimens from Costa Rica contains several young birds which are in various stages of the postjuvenile molt in early August.

Plumage notes.—In this resident, nonmigratory species there is no spring molt discernible, at least in specimens collected as late as March 5.

Colors of soft parts.—Adult: iris, dark brown; bill, black; tarsi, dark brown; feet, blackish brown. Fully grown juveniles: similar but basal half of maxillary tomia, broadly and sharply dull orange; mandible, dull orange, extreme tip dusky.

***Atlapetes gutturalis fuscipygius* Dwight and Griscom. NICARAGUA YELLOW-THROATED SPARROW.**

Atlapetes gutturalis fuscipygius Dwight and Griscom, Amer. Mus. Novit., 16, p. 3, September 9, 1921—San Rafael del Norte, Nicaragua.

Specimens collected.—Los Esesmites, 11 (February 6 to March 8, 1927).

Status.—Common in early spring, and presumably resident, in the Arid and Humid Upper Tropical Zones on Los Esesmites. The vertical range is from 6,400 to 8,500 feet (fig. 28).

Remarks.—The Los Esesmites series as a whole is not typical of *fuscipygius*, but is decidedly closer to that race than to *griseipectus*. In general the birds may be said to have the brown back, rump, and flanks of the former combined with the more extensively yellow throat and grayish breast of the latter. However, there are occasional examples in the series which are not distinguishable from topotypes of the Nicaraguan form in the American Museum of Natural History.

The yellow-throated sparrow was not found in flocks, but occurred singly or in pairs about the edges of clearings in the cloud forest and less commonly in the blackberry vines and brush tangles which bordered most of the small gullies running down from the cloud forest through the pines and bracken. They seemed to be rather sedentary, and the same pairs could usually be found day after day in the locations where they were first noticed.

Colors of soft parts.—Adults: iris, reddish brown; bill, brownish black; tarsi and feet, dark brown.

***Atlapetes gutturalis griseipectus* Dwight and Griscom. GUATEMALA YELLOW-THROATED SPARROW.**

Atlapetes gutturalis griseipectus Dwight and Griscom, Amer. Mus. Novit., 16, p. 3, September 9, 1921—Quetzaltenango, Guatemala.

Specimens collected.—San José del Sacare, 1 (March 16, 1927); Volcán de Santa Ana, 3 (May 14 to 17, 1927).

Status.—Uncommon resident of the Humid Upper Tropical Zone on Volcán de Santa Ana. Detected also, possibly as a straggler, at the extreme lower edge of the pine association at San José del Sacare (fig. 28).

Remarks.—All three of the Volcán de Santa Ana specimens are typical of the Guatemalan race, which differs from *fuscipygius* in very much more slaty (less brownish) coloration and larger throat

patch. The single example taken at San José del Sacare is also typical of *griseipectus*; in fact, it is so unmistakably that form that one cannot, on any basis, refer it to *fuscipygius*, which geographically it ought to be. While there is the probability that the range of *griseipectus* penetrates as a tongue south as far as San José del Sacare, which is a good 3,000 feet lower than the lowest elevation at which *fuscipygius* was found on the same mountain, there is also the possibility that the bird was simply a straggler from the Guatemalan highlands.

Very few birds of this species were found on Volcán de Santa Ana, and these were confined to one small area of cloud forest on the north

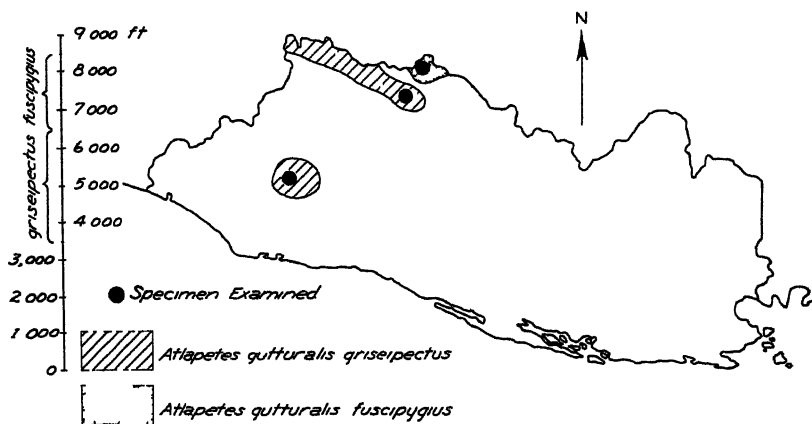


FIG. 28. Distribution of two races of the yellow-throated sparrow, *Atlapetes gutturalis*, in El Salvador.

slope of the mountain at from 6,000 to 6,500 feet altitude. In this locality the species was found in the treetops, and all three specimens were shot in the crown foliage fifty feet or more above the ground. From previous experience with the allied form on Los Esesmites it had been supposed that *Atlapetes* was exclusively a bird of the undergrowth and one always to be found on or near the ground. This colony on Volcán de Santa Ana is doubtless permanently resident, for the birds collected were in breeding condition and showed every evidence of nesting.

Spiza americana (Gmelin). DICKCISSEL.

Emberiza americana Gmelin, Syst. Nat., 1, pt. 2, p. 872, 1789—New York.

Specimens collected.—Divisadero, 6 (September 24, 25, 1925; April 12, 1926); Rio Goascorán, 1 (October 28, 1925).

Status.—Common fall and spring migrant through more open districts of the lower foothills and coastal plain.

Remarks.—The first dickcissel was found at Divisadero September 24, 1925 in an agave hedge which separated two fields of tall bunch grass. No others were seen that day, but on the 25th a compact flock of about 150 was found on a mimosa flat between Divisadero and Enquentros. A single female of the year was found in a grass-and-mimosa pasture at Rio Goascorán on October 28. All of these fall birds had completed the molt when taken, and both adults and young were in perfect new plumage. September 24 is evidently not an early migration date, for Carriker¹ records dickcissels as arriving in Costa Rica about the first week in September. The majority seem to pass along the Atlantic side, and it is probable that only a comparatively few flocks and individuals migrate along the Pacific slope. The only spring record is April 12, 1926, when a native boy brought into camp a male which he had killed from a "large" flock at Divisadero.

Melozone occipitalis (Salvin). SALVIN'S GROUND SPARROW.

Pyrgisoma occipitale Salvin, Ibis, p. 446, October, 1878—Volcán de Fuego, Guatemala.

Specimens collected.—Volcán de San Salvador, 3 (April 22, May 30, June 2, 1912).

Status.—Uncommon, but presumably a resident of brushy slopes and clearings on Volcán de San Salvador.

Remarks.—With the exception of some forest on the higher parts of the northern slope, the original vegetation on the Volcán de San Salvador has been almost entirely destroyed, and practically all zonal indications as regards distinction between Arid Lower and Arid Upper Tropical have been eliminated. At the present time Salvin's ground sparrow occupies low, scrubby growth on both the north and south slopes at altitudes of 4,500 to 5,000 feet. It is a decidedly uncommon species and the three specimens listed are all that were seen. They were taken under bushes at the edges of cornfields or similar clearings and were solitary.

This species, closely allied to *Melozone leucotis* of Nicaragua and Costa Rica, is apparently rather local throughout its range, for Salvin² found it only in a very limited area between 2,500 and 5,000

¹ Ann. Carnegie Mus., 6, p. 912, 1910.

² Biol. Centr.-Amer., Aves, 1, p. 404, 1886.

feet at the type locality. Oddly enough there appears to be no colony on Volcán de Santa Ana, which lies between Volcán de Fuego and Volcán de San Salvador. An especial search in suitable localities was made there, but with purely negative results. Since *occipitalis* is known from a few rather widely separated and very limited areas, it evidently does not possess the racial virility nor the adaptiveness of *biarcuatum*. Like that species it is probably a permanent resident wherever found.

Melozone biarcuatum (Prévost). PRÉVOST'S GROUND SPARROW.
QUATRO OJOS.

Pyrgila biarcuata Prévost, Voy. Vénus, Ois., Atlas, pl. 6, 1846—"California" and Guatemala.

Specimens and records.—Los Esesmiles, 4; Chilata, 2; Volcán de Santa Ana, 3; Volcán de San Miguel, 2; Mt. Cacaguatique, 2; San Salvador, 2; Lake Chanmico, 2. Also noted at Volcán de San Salvador.

Status.—Common resident of the foothills and mountains between 1,500 and 6,400 feet.

Remarks.—The distribution of Prevost's ground sparrow is peculiar, since, within the altitudinal limits given above, it is generally distributed through the Arid Lower Tropical and in both Arid and Humid Upper Tropical Zones (pl. XXIII). It is one of the relatively few species to have adapted itself to the coffee plantations which have so largely replaced the native undergrowth between 2,500 and 5,000 feet. Whether this identical area was the center of abundance under primitive conditions is, of course, problematical, but *Melozone biarcuatum* is today far more numerous throughout the coffee districts than is the case above or below them. The thick leaf mulch under the bushes affords an ideal scratching ground for this semiterrestrial species.

By far the highest elevation where these birds were found was on Los Esesmiles, where they were fairly common in the blackberry vines and fern bracken which grew so densely along the little ravines running down through the pines to the Sempul River. None were seen higher than 6,400 feet, but this altitude was sufficient to bring them into contact with such high mountain forms as *Atlapetes*, *Buarremon*, and *Zonotrichia*. Lake Chanmico represents the lowest altitude, but the species was not at all common there and only a few were observed in the brush tangles about the lake and in the tall bunch grass growing between mimosa clumps on the plain. On

Volcán de Santa Ana and Volcán de San Salvador they were common enough everywhere through the coffee, but in both places a few were also seen in the undergrowth at the lower edge of the cloud forest and also in the luxuriant tangles of grass and creepers that ran riot over old abandoned cornfields.

Nesting.—Dissection of specimens showed that breeding does not commence before the latter part of April. A female taken May 7 was laying.

Plumage notes.—A noticeable spring molt occurs in late February and early March, more extensive in some specimens than in others. In extreme cases most of the feathers of the crown, back, and face are renewed.

Colors of soft parts.—Adults: iris, dark brown; bill, black; tarsi, light brown; feet, slightly darker.

Melospiza lincolni alticola (Miller and McCabe). SOUTHERN LINCOLN'S SPARROW.

Passerella lincolni alticola Miller and McCabe, Condor, 37, p. 156, May 15, 1936—Bluff Lake, San Bernardino Mts., California.

Specimens collected.—Los Esesmites, 1 (February 6, 1927).

Status.—Apparently rare midwinter visitant to the extreme Arid Upper Tropical Zone on Los Esesmites.

Remarks.—The single specimen collected provides wing and tail measurements of 67 and 60 mm., respectively, and is, therefore, an extreme example of the race *alticola*. It was shot in a brush-and-grass-choked gully at 7,800 feet on the Arid Upper Tropical slope where it was with a flock of *Zonotrichia capensis costaricensis*. Another bird, evidently this species, was seen at the same time, but was lost in the flurry of *Zonotrichia*. It is probable that relatively few individuals reach this southern part of the winter range, although the subspecies *alticola* has been detected in Guatemala and the species (subsp?) accidentally as far south as Panama.

Zonotrichia capensis costaricensis Allen. CENTRAL AMERICAN CROWNED SPARROW.

Zonotrichia capensis costaricensis Allen, Bull. Amer. Mus. Nat. Hist., 3, no. 2, p. 375, September 29, 1891—San José, Costa Rica.

Specimens collected.—Los Esesmites, 19 (February 3 to March 4, 1927); Volcán de Santa Ana, 6 (May 8, 10, 1927).

Status.—Abundant resident of the higher parts of the Arid Upper Tropical Zone on Los Esesmites and also on the summit of Volcán de Santa Ana. The vertical range is from 4,500 to 8,000 feet.

Remarks. The Costa Rican form of this species was correctly defined by Allen many years ago, but its distinctness from *peruviana* seems to have been lost sight of until Griscom again called attention to its validity. The Costa Rican race, the range of which extends to extreme western El Salvador, differs from *peruviana* not alone in its smaller size and darker coloration, but by the shorter and more conical bill. It appears to be well worthy of recognition. We consider the genus *Brachyspiza* to be synonymous with *Zonotrichia* for the reasons previously given by van Rossem.¹

Griscom has recently described² a race (*Z. c. septentrionalis*) from the highlands of Guatemala which is apparently very different from *costaricensis*. Our El Salvador specimens are certainly to be referred to *costaricensis* with which they are identical in coloration. They show divergence from typical *costaricensis* in the slightly larger size, in which respect they are most nearly like *septentrionalis*, a difference only to be expected. The wings of the El Salvador series measure from 64 to 70 with an average of 66.6 mm.

On Los Esesmites these little crowned sparrows swarmed everywhere through the blackberry and wild rose tangles which grew so luxuriantly in the ravines and gullies on the pine slopes. From such centers they spread out through all sorts of low growth, the scrub of old clearings, fern bracken, and even on open, grassy ground. Toward evening they gathered again in the ravine thickets, where the males could be heard singing until nearly dark. The song, as well as the general appearance and habits of these birds, was so much like *Zonotrichia gambelii* that a person ignorant of their true identity might well be convinced that he was in fact listening to, or seeing, the common crowned sparrow of the north. At close range the black breast markings are fairly conspicuous, but the most frequent views are those of a familiar striped head with crown feathers slightly raised, whose owner looks back inquiringly before diving into the depths of a brush patch.

Nesting.—On Volcán de Santa Ana, breeding was in full swing during the month of May, 1927, and many nests were found on the 10th and 11th. The distribution of the crowned sparrows on this

¹ Auk, 46, p. 548, October, 1929.

² Amer. Mus. Novit., 438, p. 12, December 15, 1930.

mountain was confined to open, level prairie at the summit, a region which was dotted with clumps of scrubby, chaparral-like brush, agave, and widely spaced, solitary trees. As a rule the entire surface of the trunks and branches of these trees was so thickly covered with bunches and clumps of parasitic plants as to conceal them completely. In these clumps the sparrows were nesting commonly. For the most part the nests were in the course of construction, as a rule nearly finished though a few held incomplete sets. Some of the trees held several nests—in one case as many as six, and in one there were three nests not over a foot apart. Whether this colonizing was intentional or simply the result of comparative scarcity of nesting sites is not known. The actions of several pairs, found in open spots well away from any trees, presupposed them to be nesting on the ground, the conventional *Zonotrichia* location. However, no ground nests were ever discovered in spite of careful search. The nests in the trees were all of similar construction; deep, well-shaped cups of fine, dry, gray grass thickly felted with cow hair, rabbit fur, and occasional feathers. One set of two eggs and another of three, in both of which incubation had started, were taken. The ground color of both sets is pale greenish-blue, very close to "pale glaucous-blue." In the set of two, the fine, reddish brown markings form a dense cap about the larger ends of the eggs, the remainder of the shell being very sparsely marked. In the set of three, the markings are paler and more purplish brown and are rather thickly and evenly distributed over the entire surfaces, with only a slight concentration at the larger ends. The set of two measures 20.3×15.5 and 20.1×15.4 ; that of three, 20.7×15.6 ; 20.5×15.4 , and 20.4×14.9 . One juvenile just out of the nest was collected May 10.

Plumage notes.—Except for the more brownish (less clay-colored dorsal coloration, a three-fourths-grown juvenile, collected on Volcán de Santa Ana, May 10, 1927, is a duplicate of the corresponding age of *Zonotrichia gambeli nuttalli*.

Colors of soft parts.—Adults: iris, dark brown; tarsi and feet, flesh color to pale brownish flesh; bill, dusky, plumbeous brown.

***Spizella passerina cicada* Dickey and van Rossem. EL SALVADOR CHIPPING SPARROW.**

Spizella passerina cicada Dickey and van Rossem, Condor, 30, p. 359, November, 1928—San José del Sacare, Chalatenango, El Salvador.

Specimens collected.—San José del Sacare, 13 (March 16, 17, 1927).

Status.—Common, but extremely local in midwinter and spring in the pines near San José del Sacare. There is every reason to suppose the species to be permanently resident.

Remarks.—This race differs from *S. p. pinetorum* of the Atlantic lowlands of northern Central America in the richer-colored, more reddish back, restriction of the black nuchal markings, slightly paler crown cap and rump, and larger size.

Chipping sparrows were first seen January 29, 1927, when several small flocks and single birds were noted in the same locality where the above series was subsequently collected. The record was not entered in the field notes for the day as no specimens were taken and there was the chance of mistake in the identity. The habitat occupied was a rolling country covered more or less densely with pines with but little other growth. Just why *Spizella* should have been confined to an area of a few square miles when great stretches of similar territory extended for long distances in every direction is obscure. In March of the same year the numbers present were much the same as in January, but pairs were more in evidence than were small flocks. One assemblage of about twenty was found about a small spring at the edge of the road, but they may have been drawn together only temporarily by the water.

Nesting.—In March the bills of the birds collected had, for the most part, taken on the blackish hue of the breeding season, males were singing everywhere, and the condition of the specimens taken showed them to be nearly ready to breed.

Colors of soft parts.—Adults, sexes alike: bill, black or plumbeous black; tarsi and feet, brownish flesh-color; iris, dark brown.

***Aimophila rufescens rufescens* (Swainson). MEXICAN RUSTY SPARROW.**

Pipilo rufescens Swainson, Philos. Mag., new ser., 1, p. 434, 1827—Temas-cáltepec, Mexico.

Aimophila rufescens rufescens Ridgway, Bull. U. S. Mus., 50, pt. 1, p. 243, 1901—Salvador; Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 6, January 8, 1927—San Salvador; Volcán de San Salvador; Mt. Cacaguatique (crit.); Griscom, Amer. Mus. Novit., 438, p. 10, December 15, 1930—in text, (Dept.) Chalatenango; San Salvador (crit.); Bull. Amer. Mus. Nat. Hist., 64, p. 361, in text, 1932—Salvador (crit.).

Specimens and records.—San Salvador, 3; Volcán de San Salvador, 1; Mt. Cacaguatique, 1; San José del Sacare, 1; Los Esesmiles, 7;

Recorded from "Salvador"; San Salvador; Volcán de San Salvador. Mt. Cacaguatique; Dept. Chalatenango.

Status.—Fairly common resident of grassy uplands and clearings along the cordillera and locally south to the vicinity of San Salvador. (See fig. 29.) The vertical range is from 2,300 to 8,000 feet and hence, for the most part, in the Arid Upper Tropical Zone.

Remarks.—On the basis of published data, principally that of Griscom, it appears that an extension of *rufescens* projects southward along the interior cordillera through Guatemala and El Salvador to northern Nicaragua. On the volcanic coastal range, however, a radically different state of affairs exists, for in Guatemala and extreme western El Salvador appears a distinct race (*gigas*) in central El Salvador an isolated colony of *rufescens*, and terminally to the south-east another race (*pectoralis*), which is isolated on the volcano of San Miguel.

The chief requirements of this gigantic parallel of our northern rufous-crowned sparrow seem to be rocky grasslands or rough terrain covered with a relatively scanty growth of low brush and weeds; in fact, the two species apparently occupy very much the same types of environmental niches. In general, the range of *rufescens* may be said to lie well above that of *Aimophila ruficauda*, and it is only locally that the two come into direct contact. Unlike *ruficauda*, which habitually travels in flocks except during the breeding season, the present species remains in pairs throughout the year, each pair keeping to its own, usually very limited, area of grass-grown lava flow or brushy ravine.

Nesting.—A female taken on Volcán de San Salvador June 3, 1912 was apparently incubating at the time. The nesting season is probably from the middle of May to the middle of July as in the case of the next form.

Colors of soft parts.—Adults: iris, dark brown; maxilla, black; mandible, lead-blue with tip dusky; tarsi and feet, light brown or brownish flesh. Immatures: similar, but mandible bluish flesh-color.

***Aimophila rufescens gigas* Griscom. GUATEMALA RUSTY SPARROW.**

Aimophila rufescens gigas Griscom, Amer. Mus. Novit., 438, p. 9, December 15, 1930—Nebaj, 50 miles north of Quiché (altitude 6,700 feet), Guatemala.

Specimens collected.—Volcán de Santa Ana, 6 (May 12 to 15, 1927); Sonsonate, 3 (July 10 to 16, 1925).

Status.—Fairly common resident of the grass lands in the vicinity of Volcán de Santa Ana (fig. 29).

Remarks.—The eight adults of this species from extreme western El Salvador are decidedly paler, grayer, and larger than typical *rufescens* and, while not typical of *gigas*, they are certainly closer to it than to the former race. The four males vary in wing measurement from 76 to 78 mm., which is about intermediate between the two forms.

Nesting.—Birds in breeding condition were taken on Volcán de Ana May 14 and 15 and at Sonsonate July 10.

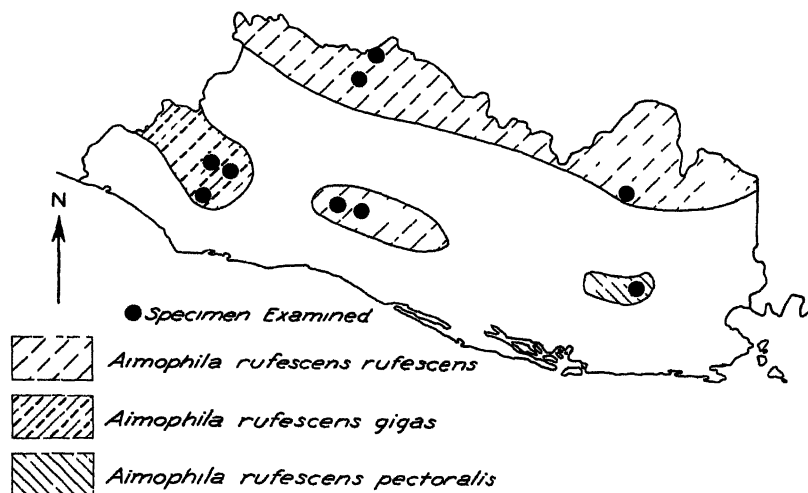


FIG. 29. Distribution of three races of the rusty sparrow, *Aimophila rufescens*, in El Salvador.

***Aimophila rufescens pectoralis* Dickey and van Rossem. SAN MIGUEL RUSTY SPARROW.**

Aimophila rufescens pectoralis Dickey and van Rossem, Proc. Biol. Soc. Wash., 40, p. 6, January 8, 1927—Volcán de San Miguel, Salvador; Griscom, Amer. Mus. Novit., 438, p. 10, in text, December 15, 1930—Volcán de San Miguel (crit.).

Specimens collected.—Volcán de San Miguel, 9 (March 12 to 25, 1926).

Status.—An abundant breeder on the open upper slopes (Arid Upper Tropical Zone) of Volcán de San Miguel, where isolated and presumably resident (fig. 29). The vertical range is from 3,000 to 7,000 feet.

Remarks.—Although this form is easily distinguished from *A. rufescens* by the larger size and grayer ventral coloration in which

the throat and median abdominal area stand out in decided contrast to the darker pectoral band, close discrimination is required to appreciate the differences between *pectoralis* and the more recently described *A. r. gigas*. Both of these large races are about equal in size, and the color differences between them are not outstanding. Compared with *pectoralis*, the Guatemalan *gigas* is slightly paler and grayer throughout; there is less contrast between the pectoral area and the rest of the underparts; the dorsal streaking is narrower and the median crown stripe less pronounced. As to the relative sizes of the three forms under consideration, the males of *rufescens* average about 73 in wing length, while *pectoralis* and *gigas* average very close to, or even exceed, 80 mm.

The south slope of Volcán de San Miguel offers extraordinarily favorable conditions for the support of a large colony of rusty sparrows. From the summit of the mountain down to about 3,000 feet there extends a series of old lava flows, cut by numerous gullies of varying depth and for the most part covered with bunch grass, agave, cactus, scrub oaks, waxberry, and similar growth. In this very exceptional environment more rusty sparrows were encountered in the space of less than three weeks than were met with in all other localities combined.

***Aimophila ruficauda ruficauda* (Bonaparte). RUSSET-TAILED SPARROW.**

Chondestes ruficauda Bonaparte, Compt. Rend., 37, p. 918, 1853—Nicaragua.

Aimophila ruficauda ruficauda Ridgway, Bull. U. S. Nat. Mus., 50, pt. 1, p. 238, 1901—part, Acajutla; Miller, Condor, 34, p. 17, January, 1932—Sonsonate (nesting).

Haemophila ruficauda Salvin and Godman, Biol. Centr.-Am., Aves, 1, p. 396, 1886—part, Acajutla.

Specimens and records.—Volcán de Conchagua, 4; San Salvador, 5; Volcán de San Miguel, 1; Sonsonate, 3; Colinas de Jucuarán, 1; Lake Olomega, 2; Divisadero, 2; Rio Goascorán, 1; Miraflores, 1; Lake Guija, 1; Barra de Santiago, 1. Also noted at Puerto del Triunfo; Colima; Mt. Cacaguatique. Recorded from Acajutla; Sonsonate.

Status.—Common, sometimes abundant, resident of cultivated and semiwooded areas throughout the Arid Lower Tropical Zone.

Remarks.—Comparison of the series of twenty-two skins with a good series from northwestern Costa Rica fails to disclose any differences of moment. Specimens from altitudes above 1,500 feet

average very slightly grayer, and this condition possibly indicates an approach to *Aimophila ruficauda connectens* Griscom of interior Guatemala. Although so listed here, we do not believe for a moment that this sparrow is an *Aimophila*.

Russet-tailed sparrows were exceedingly common everywhere in brushy tracts, about the edge of clearings, hedge rows, and in cultivated lands generally. The species is obviously one which has been definitely benefited by the altered conditions incident to the settling of the country and consequent removal of the original forest. Except during the breeding season in the late summer and early fall, one is much more likely to find these rather noisy and strikingly marked birds in flocks of twenty or more than he is to encounter individuals or pairs.

Nesting.—No nests were personally discovered. About the first of June the flocks which have been swarming in roadside hedges and brushy fields commence to break up into pairs, and young on the wing may be seen as early as the middle of July. The young of this first brood soon gather as flocks while the parents proceed with a second laying. A female, the oviduct of which contained an egg nearly ready to be laid, was taken at Rio Goascorán October 19, 1925. Roughly speaking, the breeding season may be said to occupy the four months between July 1 and November 1. Miller found fully grown young at Sonsonate July 16, 1925, and a nest containing three fresh eggs, immaculate and pale blue in color, on July 21. The site of the nest was the crotch of a bush, five feet above the ground. It was "composed chiefly of sticks and hair, deeply cupped and well built."

Plumage notes.—The postjuvénal molt occurs shortly after the birds are on the wing, and the resultant plumage in general resembles that of the adults except that there is a decided buffy suffusion everywhere; consequently the head pattern and other markings are much less clear-cut. Apparently all of the juvenal plumage is replaced except for the tail, which persists at least until the following spring, when it is renewed at the first prenuptial molt. This sequence is shown by several specimens. The prenuptial molt, both in adults and young of the previous year, commences in late February and involves in varying proportion the body plumage and in the case of young birds sometimes the tail. The fall molt is initiated in September or October.

As data on the subject accumulate, it becomes increasingly evident that the processes of breeding and molting are not so

closely interrelated as was formerly supposed; in fact, in the cases of many species, there appears to be little or no connection. The present species is another example. Although the "prenuptial" molt takes place in the early spring, there is little evidence of sexual activity until a good three months later, and again, the fall or "post-nuptial" molt is well under way at a time when second sets are being laid. A female taken on October 29 was laying, although in the midst of the fall molt at the time, and a male taken September 3 was in full breeding condition although at the same time in molting plumage.

Colors of soft parts.—Adults: maxilla, black or brownish black; mandible, light blue to bluish flesh-color; iris, brown; tarsi and feet, brownish flesh-color.

Stomach contents.—Small seeds, 5; small buds and beetles, 1; beetles, 1.

***Chondestes grammacus strigatus* Swainson. WESTERN LARK SPARROW.**

Chondestes strigatus Swainson, Philos. Mag., new ser., 1, p. 435, June, 1827—Temascáltepec, Mexico.

Specimen collected.—La Aldéa, 1 (March 12, 1927).

Status.—Uncertain. Detected only in spring on the *Crescentia* plains of southern Chalatenango.

Remarks.—The only specimen taken is not distinguishable from examples from the western United States. When shot it was with another bird which escaped into the brush and could not be found again. On March 19 another lark sparrow was seen near the place where the first was shot, but it also escaped. The place where these birds were seen is a barren rolling prairie, covered with a thin growth of dry grass and huacal trees. Precisely similar areas are common all along the base of the cordillera and also in places in the lowlands of the Oriente, but neither in these nor in the higher pine associations, which apparently offered every inducement, were lark sparrows found.

***Ammodramus savannarum perpallidus* (Coues). WESTERN GRASSHOPPER SPARROW.**

Coturniculus passerinus var. *perpallidus* "Ridgway" Coues, Key N. A. Birds, p. 137, Oct., 1872—in text, "dry western regions" (=Antelope Island, Great Salt Lake, Utah).

Specimens and records.—Volcán de San Miguel, 1 (March 23, 1926); Los Esesmiles, 2 (February 13, March 4, 1927); Volcán de

Santa Ana, 1 (May 7, 1927). Also noted on Volcán de Conchagua (February 27, 1926).

Status.—Uncommon midwinter visitant and spring migrant in the Arid Upper Tropical Zone both on the coastal and interior ranges. Detected between February 1 and May 7.

Remarks.—The bills of all four of the specimens collected are decidedly heavier than in *perpallidus* as represented by California and Arizona examples, but otherwise are not distinguishable from that form. Probably they come from a section somewhat further east where *perpallidus* commences to intergrade with *australis*. The bird, a female, taken on Volcán de Santa Ana on May 7 was excessively fat, but showed no trace of breeding activity and was without doubt simply a late migrant.

The habits of grasshopper sparrows in midwinter appear in no way to differ from those in their summer home. On Conchagua, San Miguel, and Santa Ana they were found in open grassland, where they rarely flushed until almost stepped on and after a short zigzag flight dropped again into the short grass. On Los Esesmites they were not so rare as on the coastal peaks, and very few days passed between February 1 and March 8 without one or two flushing from the knee-high fern bracken which grew in more open places on the pine-dotted southern slopes.

***Passerculus sandwichensis brooksi* Bishop. BROOKS' SAVANNAH SPARROW.**

Passerculus sandwichensis brooksi Bishop, Condor, 17, p. 187, 1915—Chilliwack, British Columbia.

Specimens collected. Lake Olomega, 2 (April 6, 1926).

Status. Rare spring migrant through the lowlands.

Remarks.—The two specimens collected cannot be distinguished from a series of breeding birds from the Puget Sound region of Washington.

On April 6, 1926, savannah sparrows were not uncommon in the low growth along the north shore of Lake Olomega, but all were so wild that it was only with difficulty that two specimens were secured. The passage through the locality must have been a very rapid one, for although special search was made, none were seen after that date. Both specimens were just completing the spring molt, which is most extensive on the head and foreparts of the body, but which includes also the tertials and the central pair of rectrices.

***Volatinia jacarini atronitens* Todd. BLUE-BLACK GRASSQUIT.**

Volatinia jacarina atronitens Todd, Proc. Biol. Soc. Wash., 23, p. 72, 1920—
Campeche, Campeche, Mexico; Miller, Condor, 34, p. 17, January, 1932
—Sonsonate (nesting).

Specimens and records.—Sonsonate, 5; Chilata, 4; Lake Chanmico, 5; Volcán de Santa Ana, 1; Lake Olomega, 3; Divisadero, 3; San Salvador, 3; Zapotitán, 2; Mt. Cacaguatique, 1; Los Esesmiles, 2; Rio San Miguel, 1. Also noted at Volcán de San Salvador; Puerto del Triunfo; Colima; Lake Guija.

Status.—Abundant resident of fields, grasslands, and clearings everywhere from sea level at least to 8,000 feet.

Remarks.—Blue-black grassquits were sufficiently numerous even during the breeding season to be a decided nuisance, but in the fall, winter, and spring the swarms found everywhere in open country were, at times, an actual hindrance to the collection of other species.

The local distribution of this species is from sea level to at least 8,000 feet and almost certainly to 8,700. Associations in which the birds were observed were grasslands, old clearings grown with a tangle of weeds and vines, close cropped pastures, sugar cane, lava flows, tule marshes, mimosa thickets, pine woods, and even in the more open stands of cloud forest. Dense forest, in fact, seems to be about the only type of cover entirely free of them. The greatest concentrations were in open country grown extensively with bunch grass and mimosa brush.

The concealed white shoulder patches of the males play a prominent part in the courtship display, which begins as soon as the immense flocks of the winter and spring commence to break up into pairs in early May. At the conclusion of the short, high-pitched, insect-like buzz which constitutes the song, the males pop up in an explosive leap which carries them a good two feet or more straight into the air. As they descend head first, the snowy shoulder patches are thrown out and are startlingly conspicuous, even from a distance. This performance is repeated every few seconds, and the sight of several males all leaping at once reminds one of nothing so much as popcorn in a hopper, if one can visualize black and white popcorn!

Nesting.—Courting begins in early May and, since males can be seen performing until late in August, it is probable that the breeding season roughly corresponds to these dates. The height of the season—to judge from the females collected—is from early June to late

August, or even September. Miller (sup. cit.) found several nests at Sonsonate between July 16 and 20, 1925, which he describes as "neat, thin, wiry baskets of marsh grass and plant fibres which were remarkably rigid even though the bottoms and sides could be seen through." Three eggs appear to constitute the normal set in this locality.

Plumage notes.—The plumage sequence shown by this series is so at variance with published statements that it is difficult to reconcile them. According to the (conclusive) evidence at hand the juvenal male has a complete postjuvenal molt in the very late fall or early winter which results in a plumage very similar to the adult female except that the wings and tail are dull black with olive or brownish edgings. In the following early summer (May and June) there is a prenuptial body molt which, in extreme cases, produces a glossy, blue-black plumage like the adult summer male, but which usually produces irregular patches of blue-black feathers mixed in with the old, brown, fall plumage. Following this comes the first post-nuptial plumage which is evidently identical with that of the post-nuptial or adult winter male. The winter plumage of adult males is that in which the black is more or less conspicuously edged and tipped with brown dorsally and with gray or brownish gray below. The change from the gray-tipped winter to the glossy black summer plumage is *not* the result of wearing away of the paler tipping, but comes from a complete prenuptial body molt. This takes place in May and June, the earliest date of its inception being April 27.

The females, like the males, have two body molts a year, molting in the early summer to a plumage decidedly more slaty (less brownish) than the winter dress. As in the males, the prenuptial molt starts sometimes as early as the last week in April.

Colors of soft parts.—Adult males: iris, tarsi, feet, and maxilla, black; mandible, light blue with tip and tomlia, black. Adult females: iris, dark brown; maxilla, dark brown; mandible, bluish flesh-color; tarsi and feet, plumbeous horn-color. Juveniles: similar to female, mandible pale brown.

***Tiaris olivacea pusilla* Swainson. MEXICAN GRASSQUIT.**

Tiaris pusilla Swainson, Philos. Mag., new ser., 1, p. 438, 1827—Real del Monte, Hidalgo, Mexico.

Specimens and records.—Los Esesmiles, 2 (February 15, March 1, 1927); San José del Sacare, 1 (March 12, 1927). Also noted at Los Esesmiles (February 1, 1927).

Status.—Sporadically abundant in midwinter and early spring in the pine association of the Arid Upper Tropical Zone along the cordillera. The extremes of altitude were 3,600 and 6,500 feet.

Remarks.—On February 1, 1927, Mexican grassquits were present by hundreds in the brush and hedgerows along the trail winding over the pine mesa on Los Esesmites. The altitude at this place is about 6,500 feet. A few days later not one was to be found, and it was not until the 15th that a small flock, from which a male was shot, was found in the scrub of an abandoned field at 6,400 feet. In this field the head-high weeds were overgrown with a tangle of wild blackberry vines, the whole forming a barrier through which it was almost impossible to force one's way. On March 1 another specimen, a female, was taken in the same thicket. The species was not seen again until a few were found in early March in the open, pine-prairie basin near San José del Sacare. Here they were in pairs and possibly preparing to breed, for the males were singing and the single female that was taken was approaching breeding condition. Although not especially difficult to approach when in the weed tangles on Los Esesmites, birds were so extremely wild at San José del Sacare that only after much effort was a specimen collected.

The song is a cicada-like chirring, very much like that of a chipping sparrow.

Colors of soft parts.—Adults: bill, blackish brown; iris, tarsi, and feet, dark brown.

***Passerina cyanea* (Linnaeus). INDIGO BUNTING.**

Tanagra cyanea Linnaeus, Syst. Nat., ed. 12, 1, p. 315, 1766—South Carolina.

Cyanospiza cyanea Salvin and Godman, Biol. Centr.-Amer., Aves, 1, p. 364, 1886—La Unión; Ridgway, Bull. U. S. Nat. Mus., 50, pt. 1, p. 582, 1901—La Unión.

Specimens and records.—Rio Goascorán, 3 (October 26 to 29, 1925); Divisadero, 3 (November 2 to 14, 1925); Mt. Cacaguatique, 2 (December 16, 20, 1925); Rio San Miguel, 1 (February 11, 1926); Volcán de San Miguel, 2 (March 13, 22, 1926); San Salvador, 6 (March 4 to April 19, 1912); Chilata, 1 (April 30, 1927). Also noted at Colima (January 21, 1927). Recorded from La Unión (no date, but probably in March, 1863).

Status.—Common fall and spring migrant and winter visitant to grasslands and fields throughout the Arid Lower and Arid Upper Tropical zones. The extreme dates of arrival and departure were October 26 and April 30.

Remarks.—The indigo bunting was very common in fall and spring, when good-sized flocks were found in suitable territory everywhere below 3,500 feet. Although the species was less numerous in midwinter than during migrations, still it was fairly common in grasslands, fields, and pastures, and at times even invaded the more open second-growth woodland. On Volcán de San Miguel in March, 1926, a good many flocks, evidently composed chiefly of migrants, were seen in the grasslands up to an elevation of at least 3,500 feet. In same locality a few even penetrated the coffee groves, an environment in which they seemed strangely out of place.

Plumage notes.—Both sexes have a prenuptial molt which takes place chiefly in March and April. Adult males sometimes begin this molt in midwinter. One, taken December 16, is spangled all over with new, blue feathers, most of them still partly sheathed. Another, taken February 11, has progressed so far that the blue is in excess of brown.

***Passerina ciris ciris* (Linnaeus). EASTERN PAINTED BUNTING.
SIETE COLORES.**

Emberiza ciris Linnaeus, Syst. Nat., ed. 10, 1, p. 179, 1758—South Carolina.

Specimens and records.—Divisadero, 2 (November 13, 1925); Mt. Cacaguatique, 1 (December 3, 1925); Puerto del Triunfo, 6 (January 11 to 22, 1926); Rio San Miguel, 2 (February 12, 21, 1926); San Salvador, 3 (February 24, March 29, 30, 1912); Hacienda Chilata, 1 (April 27, 1927). Also noted at Divisadero (November 12, 1925).

Status.—Fairly common in fall, winter, and spring throughout the Arid Lower Tropical Zone. Extreme dates of arrival and departure were November 12 and April 27.

Remarks.—The first painted buntings to arrive in the fall were several small flocks, composed chiefly of old males, which were noted in a weed-grown field at Divisadero on November 12, 1925. After that date the species was found in moderate numbers in most of the lowland localities visited during the winter and spring and was even detected at an elevation as high as the extreme upper limit of the Arid Lower Tropical Zone at 3,500 feet on Mt. Cacaguatique.

No spring migration waves which were recognized as such, were noted in the case of this species. After the first of April there was a marked decrease in numbers everywhere, and the most belated individual to be seen was taken at Chilata on April 27, 1927.

Passerina ciris pallidior Mearns. TEXAS PAINTED BUNTING.
SIETE COLORES.

Passerina ciris pallidior Mearns, Proc. Biol. Soc. Wash., 24, p. 217, October 31, 1911—Fort Clark, Kinney County, Texas.

Specimens collected.—Barra de Santiago, 2 (April 1, 12, 1927).

Status.—Rare spring migrant through the Arid Lower Tropical Zone.

Remarks.—The two specimens recorded appear to be typical of the pale-colored, western race. Both are females and they are identical with a series of breeding *pallidior* from Sabinas, Coahuila. While the differences between *ciris* and *pallidior* are sufficiently constant to be recognizable in old males and in females of all ages, the young (green) males of these races appear to be inseparable.

Presumably the two Barra de Santiago birds were spring migrants. At any rate, they seemed, in each case, to be with marked waves of northbound transients such as flycatchers and vireos, which were migrating through the low scrub of the sandy peninsula.

Cyanocompsa parellina dearborni Miller and Griscom. CENTRAL
AMERICAN BLUE BUNTING.

Cyanocompsa parellina dearborni Miller and Griscom, Amer. Mus. Novit., 184, p. 1, September 24, 1925—San Rafael del Norte, Nicaragua.

Specimens collected.—Volcán de Conchagua, 3 (February 28 to March 3, 1926); Lake Olomega, 10 (July 28 to August 30, 1925); Colinas de Jucuarán, 1 (August 13, 1925); Divisadero, 1 (September 25, 1925).

Status.—An uncommon inhabitant of forest undergrowth during the spring, summer, and fall, in the Arid Lower Tropical Zone in the Oriente. The species is apparently absent during the period from September 25 to February 28.

Remarks.—Ludlow Griscom, who has examined some of the above specimens, considers them to belong to the race *dearborni*, recently described by himself and W. DeWitt Miller from the mountains of Nicaragua.

This diminutive grosbeak is an inhabitant of the dark undergrowth of the Arid Lower Tropical woods and occurs from as low as 200 feet up to 3,500. Because of its peculiar habitat it is easily overlooked, and for this reason we do not state positively that the species is migratory. However, in spite of a careful search during the winter months not a single example was detected, even in localities in which

it was relatively common during the summer. Moreover, the actions during the early fall were decidedly those of birds preparing to leave the locality. Both at Olomega and Divisadero they occurred in small flocks of eight or ten, present one day and absent the next. In August, 1925, several small flocks were encountered in the woods about Lake Olomega and in the dark ravines on the slope of the Colinas de Jucuarán, while in early February of the following year an intensive search in the same localities failed to disclose a single bird. The first to be found in the spring was a solitary female taken February 28 on Volcán de Conchagua. Four days later a pair was taken in one of the ravines near the summit of the same mountain.

The only occasion when this little grosbeak was seen in an environment other than forest undergrowth was when a flock composed of two blue males and four or five females or young males was seen at the edge of some mimosa scrub at Divisadero. These birds were feeding in the open in company with a number of ground doves and russet-tailed sparrows. They were seen in the locality only on the one date (September 25, 1912) and probably were only transients.

Nesting.—Birds in pure juvenale plumage were taken in late July and throughout the month of August.

Plumage notes.—The single juvenal male is decidedly darker and more chocolate (less umber) brown than the six juvenal females. It also has a few dark blue feathers, which by their texture are evidently a part of the juvenal plumage, scattered along the malar region.

Colors of soft parts.—Adult males: iris, dark brown; bill, tarsi, and feet, blackish brown. Adult females not recorded. Juveniles of both sexes: iris, bill, tarsi, and feet, dark brown, the mandible usually paler and the tarsi and feet varying to brownish flesh-color.

Stomach contents. Small seeds and fine vegetable matter, 8; seeds and small caterpillar, 1; small grasshopper, 1.

***Guiraca caerulea caerulea* (Linnaeus). EASTERN BLUE GROSBK.**

Loxia caerulea Linnaeus, Syst. Nat., ed. 10, 1, p. 175, 1758—South Carolina.

Specimens collected.—Divisadero, 3 (October 20, 1925; April 10, 13, 1926).

Status.—Rare fall and spring migrant along the cordilleran foothills.

Remarks.—Only three specimens of the eastern blue grosbeak were taken. As El Salvador is south of the southernmost station

recorded by Dwight and Griscom¹ it is probably close to the extreme limit of the winter range of the race. However, the three local records are obviously those of migrants, and *caerulea* may be expected to occur, at times, still farther south.

All of the three birds were collected in grasslands, fields, and mimosa brush, the typical habitat of the breeding form in the same locality.

***Guiraca caerulea lazula* (Lesson). CENTRAL AMERICAN BLUE GROSBEAK. AZULEJO.**

Pitylus lazulus Lesson, Rev. Zool., 5, p. 174, June, 1842—San Carlos, Centre-Amérique (=La Unión, El Salvador).

Guiraca caerulea lazula, A. O. U. Check-list, 3rd ed., p. 285, 1910—part, San Carlos, Salvador; Dwight and Griscom, Amer. Mus. Novit., 257, pp. 1, 2, March 14, 1927—San Carlos, Salvador (crit.); Miller, Condor, 34, p. 16, January, 1932—Sonsonate; Lake Olomega (nesting).

Specimens and records.—Volcán de San Miguel, 2 (March 15, 22, 1926); Divisadero, 19 (March 29 to April 13, 1926 [spring] and September 28 to November 12, 1925 [fall]); San Salvador, 2 (April 26, 1912); Miraflores, 1 (June 6, 1927); Zapotitán, 2 (June 22, 1927; June 29, 1912); Sonsonate, 2 (July 23, 1925); Lake Olomega, 9 (August 9 to 30, 1925); Colinas de Jucuarán, 2 (August 7, September 7, 1925); San Sebastián (Dept. La Unión) 1 (October 9, 1925). Also noted at Santa Rosa (October 24, 1925); Rio Goascorán (October 28, 1925); lowlands near Chilata (April 29, 1927); Volcán de San Miguel (March 12, 1927). Recorded from "San Carlos" [=La Unión]; Sonsonate; Lake Olomega.

Status.—Common summer visitant to the grasslands, cornfields, and clearings of the Arid Lower Tropical Zone. Especially numerous during the spring and fall migrations which occur principally in late March and late October. The extreme dates of arrival and departure were March 12 and November 12.

Remarks.—Dwight and Griscom in their recent review of the races of *Guiraca caerulea* have already shown the nomenclatural changes made necessary by the restriction of the name *lazula* to the Central American breeding form. In an effort to make certain of the applicability of the name *lazula* to the form under discussion, Outram Bangs very kindly sent one of our typical males to Paris to be compared with Lesson's type. Unfortunately Berlioz stated that the type is not now in the Paris Museum and its whereabouts is

¹ Amer. Mus. Novit., 257, p. 4, March 14, 1927.

unknown. There is little doubt, however, that the description applies to the breeding form.

While we agree in the main with the findings of Dwight and Griscom, there is one point on which we disagree. As regards Nelson's *Guiraca chiapensis*, there can be no question that it is a strict synonym of *Guiraca caerulea lazula* and not of *G. c. eurhyncha* (Coues). We have examined the type of *chiapensis* and can match it perfectly with several *lazula*. For this unfortunate determination of the name *chiapensis* and the consequent recording of Chiapas and Guatemala specimens as *G. c. eurhyncha*, the present writers are entirely to blame. Dwight and Griscom requested our El Salvador series for examination at the time they wrote their review, but through oversight and not through intent these birds were never forwarded. Thus the identity of *chiapensis* with *lazula* was not known to them.

The range of *lazula* extends northward along the Pacific coast of Central America from Costa Rica at least to Chiapas and probably to the Isthmus of Tehuántepec. Ridgway records a specimen of "*chiapensis*" from an unknown locality in Oaxaca, whose measurements can apply to no race other than *lazula*. The race *lazula* has not been previously recorded from Honduras. Therefore it may be permissible to record the fact at Rio Goascorán they were equally common on both sides of the river which marks the boundary between El Salvador and Honduras.

It was surprising to find that *lazula* was only a summer resident in El Salvador and was absent entirely during the winter months. The periods of greatest abundance were during the migrations when, in addition to those which made up the breeding population, there were numerous individuals passing through on their way to more northern breeding grounds in the spring and on their southward journey in the fall. Over grasslands and other open lowland country blue grosbeaks were literally swarming after the middle of March. The peak of numbers seemed to be reached about the first week in April, but most of these soon passed on, and after the middle of that month there remained only the permanent, summer population. In the fall, after about September 1, the adults and young of the year gathered into small, loose flocks of a dozen or fewer and drifted about the country until the exodus commenced. The last fall record for the species was November 12, an exceptionally late date represented by a single specimen. The absence of *lazula* from El Salvador in winter naturally leads to speculation as to the winter

range. Dwight and Griscom state that the race is permanently resident in western Nicaragua and Costa Rica, but if this is the main winter range it seems inconceivable that more specimens should not have been collected in those countries.

The local distribution of the Central American blue grosbeak centers about the cultivated lands of the lower hill country, for there, naturally, exists the greatest relative proportion of suitable terrain. The extremes of altitude at which *lazula* was found varied from sea level, at La Unión, to the grasslands along the summit of the Colinas de Jucuarán at about 2,200 feet, and at San Salvador at 2,300 feet. In March, 1927, numbers of birds were seen at some 2,700 feet in the scrub and grass just above the line of forest on Volcán de San Miguel. Most of these were obviously migrants, but one or two pairs were always to be found in the same places and they possibly would have nested there.

Nesting.—Soon after arrival in the spring the incoming birds pair off, but breeding apparently does not begin until late in April. A pair taken at San Salvador April 26, 1912 were certainly breeding at the time. What was probably an exceptionally late nesting was observed at Lake Olomega August 18, 1925. The nest was in a small bush in the tangle of an old clearing adjoining a cornfield. It was similar to nests of northern races; that is, it was composed of weed stems and grass, with a lining of finer grass. The three eggs were immaculate, pale blue. They are not now available for measurement.

Plumage notes.—The postjuvenile molt certainly varies according to the time the individual brood is raised. A specimen taken August 7 had nearly completed the molt by that date; another taken August 11 is in pure juvenal plumage, and another taken September 28 was about halfway through. The annual molt of the adults takes place very late in the fall. The earliest date showing its inception is October 9, and a specimen taken on November 12, while nearly complete as to body plumage, had only just begun to molt the wings and tail.

In the spring the young males have a partial body molt which results in the appearance of individual blue feathers, or even irregular patches of that color. One such bird, taken on April 13, had acquired a complete new set of rectrices as well. That young males sometimes breed in this plumage was shown by two specimens, taken on June 29 and August 9, respectively, both of which were with breeding females.

The young females have a head and neck molt in the spring (first prenuptial). A long series of adults of both sexes, taken in March and April, fails to disclose any prenuptial molt.

Colors of soft parts.—Adult males: iris, dark brown; maxilla, tarsi, and feet, blackish brown; mandible, pale, plumbeous blue, tip sometimes darker. Adult females: iris, maxilla, tarsi, and feet, dark brown; mandible, brownish flesh-color. Juveniles, both sexes: similar to adult female, but mandible dark brown like maxilla. The mandible of young birds becomes paler by the end of the postjuvenile molt, and the young are then like the adult female. In the spring the mandible of some young males becomes blue like that of the adult males, but in others it remains substantially as during the previous fall.

Hedymeles ludovicianus (Linnaeus). ROSE-BREASTED GROSBEAK.

Loxia ludoviciana Linnaeus, Syst. Nat., ed. 12, 1, p. 306, 1766—Louisiana.

Specimens collected.—Olomega, 2 (October 30, 1925); Divisadero, 2 (November 11, 12, 1925); Mt. Cacaguate, 4 (November 21 to December 11, 1925); Puerto del Triunfo, 2 (January 9, 22, 1926); San Salvador, 1 (April 4, 1912); Chilata, 1 (April 22, 1927).

Status.—Common fall migrant and less common in winter and spring in the Arid Lower Tropical Zone. Noted from sea level to 3,500 feet. Extreme dates of arrival and departure are October 30 and April 22.

Remarks.—The first rose-breasted grosbeaks to be detected in fall were two males which were collected by Morales at Olomega October 30. These were evidently earlier than normal, for none were seen about Divisadero until November 11, when a few were noticed in the mimosa thickets and in hedgerows about the town. They became increasingly common until the 15th of that month, at which time the collecting base was shifted to the hill country on Mt. Cacaguate. In this latter locality in late November and all through December a few were seen daily, principally in the trees shading the coffee, but occasionally at the edge of the oaks as well. However, neither here nor at Puerto del Triunfo in January were they anywhere nearly as common as during the fall migration. In the spring a male was seen (but not collected) at San Salvador on March 16, 1912; a female was collected at that place on April 4 of that year and three birds were seen at Chilata on April 22, 1927. As these are all our spring records, it is pretty certain that there were no pronounced northward migration flights.

Plumage notes.—A female of the previous year was undergoing a heavy body molt when taken on April 4. An adult male taken April 22 had finished the spring molt and was in full breeding plumage.

***Sporophila moreletii mutanda* Griscom. PACIFIC SEEDEATER.**

Sporophila moreletii mutanda Griscom, Amer. Mus. Novit., 438, p. 7, December 15, 1930—Hacienda California, near Ocos, Guatemala; van Rossem, Bull. Mus. Comp. Zool., 77, p. 422, in text, Dec., 1934—El Salvador (crit.).

Specimens collected.—Lake Olomega, 4; Puerto del Triunfo, 1; Divisadero, 1; Sonsonate, 1; Hacienda Zapotitán, 1; Hacienda Chilata, 6; Barra de Santiago, 5; Volcán de Santa Ana, 1; Lake Huija, 1.

Status.—Fairly common resident of brush and grasslands throughout the Arid Lower Tropical Zone and, locally, to clearings in the Humid Upper Tropical. Extremes of altitude were sea level and 4,500 feet.

Remarks.—The series of fifteen adult males shows every gradation from the white-throated type to birds with throats nearly as dark as in the black-throated phase of *S. aurita*. The white collar also varies accordingly. In the darkest specimens it is little more than a broken narrow line on the sides of the neck, while in the whitest it forms a complete, broad collar interrupted by a narrow strip of black at the nape. The black pectoral band is somewhat variable in width.

This seedeater is distributed over much the same type of country as is *Volatinia*, but instead of ranging into the high mountains it does not normally extend upward beyond the Arid Lower Tropical Zone. Extensive clearings in the cloud forest on Volcán de Santa Ana have permitted the establishment of the species up to 4,500 feet, but the center of abundance is in the lowlands. Compared with *Volatinia* both the present species and the next are very uncommon. Flocks up to fifteen or twenty are found in winter and early spring, but usually not more than half a dozen birds are seen together.

Nesting.—The condition of specimens taken indicates a breeding season from early June to the middle of August.

Plumage notes.—The postjuvenile male resembles the adult female but is slightly larger, and the remiges and rectrices are dull black or brownish black. The first prenuptial molt is variable; one specimen (which, however, had not fully completed the molt on

April 27) has the female type of plumage still predominating while another is more nearly like the adult males. The annual molt occurs in the fall, very much earlier than in *Volatinia*, for it had just started in a specimen taken August 18 and was virtually completed as to body plumage in one taken October 2. There is a more or less extensive prenuptial molt in the adults, as well as in younger birds, which is shown by several specimens taken from April 9 to 30. The variable amount of olive-tipping to the feathers of the back in older males may be individual or due to age. In some it is narrow and has disappeared by midwinter; in others it persists all through the year on such feathers as escape the following prenuptial molt.

Colors of soft parts.—Adult males: bill, black or brownish black; iris, dark brown; tarsi and feet, dark plumbeous or brownish black. Females and young not recorded.

Stomach contents.—Seeds exclusively, 2.

***Sporophila minuta parva* (Lawrence). RICHARDSON'S SEEDEATER.**

Spermophila parva Lawrence, Ann. New York Acad. Sci., 2, p. 382, May 28, 1883—Tehuántepec, Oaxaca.

Sporophila minuta parva Miller, Condor, 34, p. 17, January, 1932—Lake Olomega (nesting).

Specimens collected.—Lake Olomega, 10; Lake Guija, 3; Puerto del Triunfo, 1; San Sebastián, 1.

Status.—Common resident of fresh-water marsh growth in the Arid Lower Tropical Zone. The vertical range is from sea level to about 1,500 feet.

Remarks.—The name "marsh seedeater" would be an appropriate one for this species, for during the breeding season it was confined to mimosa, wild roses, and other low, thorny growth in the immediate vicinity of water (pl. XXIV). During the winter at Puerto del Triunfo a good many were found in tall, head-high grass in a field near the town, but this was the sole occasion that *parva* was found away from a lacustrine habitat.

This species was much less common than *mutanda* even though it might outnumber the latter in certain restricted associations. Generally speaking, *mutanda* kept to the weed-grown fields, grasslands, and the low tangles of abandoned clearings, while *parva* occupied the more restricted habitat of marsh briars. The two at times occurred together, though, for *mutanda* sometimes invaded marsh

lands and, conversely, *parva* occasionally took to the adjacent grass. Like *mutanda*, this species tends to flock during the winter months.

Nesting.—Probably two broods are raised each year. The specimens taken at Lake Guija in late May, 1927, were certainly breeding at the time, as were those at Lake Olomega in late July, August, and early September in 1926. A nest found at San Sebastián July 29, 1912 was placed in the triple crotch of a rose briar about two feet above the shallow water of an immense tule marsh. It was tightly and compactly woven of fine grasses and weed stems, with a lining of still finer grass. The measurements were $2 \times 2\frac{1}{2}$ inches outside diameter with an outside depth of $1\frac{1}{2}$ inches. The very small and deep cup measured $1 \times 1\frac{1}{2}$ inches in diameter at the brim and was 1 inch deep. Only two eggs were in this nest, evidently a complete set for the male was on the nest when it was discovered. They were white with a heavy sprinkling of minute, dark brown and purplish spots which decreased rapidly in number toward the smaller end. These eggs were disposed of years ago and their measurements cannot be given here. The brief description is from field notes made when they were collected. Miller (sup. cit.) describes a nest, also containing two eggs, taken at Lake Olomega on August 22, 1925, which was essentially similar in situation and construction.

Plumage notes.—The several steps to maturity will require a large series of specimens accompanied by careful field notes before they can be properly described. It is not impossible that males require three years to obtain the highest plumage, for there are three stages represented among breeding males collected at the same time of year. One of these males is similar to the females and postjuvenile males; three are varyingly patchy with mixed rufous and white underparts and mixed blue-gray and brown upperparts; while two have pure colored plumage, that is, they have uniform rufous underparts and rumps and clear blue-gray heads and backs. Correlated with these three types of plumage are three types of wing patterns. The first is exactly like those of known postjuvenile, fall birds (i.e. with no white spot at the base of the primaries); the second has a white spot at the base of the primaries, but the wing coverts are brown edged; while the third has the white spot combined with blue edged coverts.

Young of the year, just completing the postjuvenile body molt, were taken September 6.

Colors of soft parts.—Adults and subadult males: iris, dark brown; bill, brownish black; tarsi and feet, dark brown. One-year-old males,

postjuvenile males and females: iris, dark brown; bill, light, reddish brown with maxilla paler; tarsi and feet, dark brown.

Stomach contents. Tiny seeds exclusively, 7.

***Spinus notatus oleaceus* Griscom. HONDURAS SISKIN.**

Spinus notatus oleaceus Griscom, Proc. New Eng. Zool. Club, 13, p. 61, November 7, 1932—Cerro Cantorál, Dist. of Achagua, Honduras.

Specimens collected.—Los Esesmiles, 8 (February 7 to March 2, 1927); San José del Sacare, 3 (March 17, 1927).

Status.—Common breeder (probably resident) in the Arid Upper Tropical pine forests of the cordillera. The vertical range is from 3,600 to 8,000 feet.

Remarks.—The black-headed siskin was confined to the great pine forests in Chalatenango, and although a careful search was made on both Conchagua and Mt. Cacaguatique, where there is a relatively limited pine growth, none was ever seen in either locality. In the pine association on Los Esesmiles, and continuously from there to San José del Sacare, the black-headed siskin was one of the most common and characteristic species. At that season (February and March) pairs were in evidence everywhere but, in addition, Morales noted an immense flock, which he was certain contained several hundred birds, during the latter part of February.

In spite of the goldfinch-like coloring, the actions and call-notes of the species *notatus* remind one forcibly of the pine siskin of the north, and the resemblance when the birds are in flight is heightened by the conspicuous yellow wing and tail markings.

Nesting.—Breeding begins at a very early date, for the six females, all taken between February 8 and March 2, were either incubating or laying at the time.

Plumage notes.—Four of the females have the longer under tail coverts conspicuously streaked, while the other two are similarly but less prominently marked. This is perhaps a sex character which has been overlooked, for all five males are immaculate in this respect. In this form there is otherwise very little difference between the sexes, though the females average slightly darker and greener than the males, with the yellow wing and tail markings smaller, and with the black extending not quite as far down on the upper chest. In the northwestern race *Spinus notatus forreri* the difference between the sexes seems to be much more pronounced.

Colors of soft parts.—Adult males: bill, pale blue with terminal one-third, dusky; tarsi, feet, and iris, dark brown. Females not recorded.

***Spinus psaltria croceus* Jouy. CENTRAL AMERICAN GOLDFINCH.**

Spinus psaltria croceus Jouy, Proc. U. S. Nat. Mus., 16, no. 975, p. 780, April 18, 1894—Panama.

Specimens collected.—Mt. Cacagualique, 6 (November 29 to December 14, 1925); Los Esesmiles, 1 (March 4, 1927); Zapotitán, 12 (June 21 to 23, 1927).

Status.—Fairly common midwinter breeder in the oak-pine association of the cordillera, descending, at least in part, to the lowlands during the summer.

Remarks.—On Mt. Cacagualique in November and December, 1925, goldfinches were not uncommon in the pines and oaks. There they were obviously breeding and were usually in pairs. One of the two females was incubating, and the other had her crop packed with food, evidently for young birds. The single female taken on Los Esesmiles in March, 1927 had finished breeding at the time.

Aside from the intense and brilliant coloration of the males there was nothing which impressed one so much as the extraordinary wildness of these goldfinches. In spite of the fact that they were seen daily on Mt. Cacagualique, it was more than a week before the first specimen was taken. Males were usually seen perched in the high leafless oaks, from which they flew at the first sign of approach. When they were in summer quarters at Zapotitán a total of probably 200 was found in a hundred-acre field grown to sunflowers, thistles, and waist-high weeds. Although common, the birds were not in large flocks, but were scattered everywhere in small groups and pairs, working at the sunflower and thistle heads. Three days of hard work in this field yielded only twelve specimens, for here, as elsewhere, it was difficult to approach them within fifty yards.

The sunflowers and small yellow thistles on which these birds were feeding at Zapotitán were said to be extralimital species brought in with temperate zone seed grain from California. As goldfinches were found in no lowland locality, other than at this comparatively modern hacienda where considerable experimenting with foreign farm products was taking place, there arises the possibility that *Spinus psaltria* has only recently invaded the lowlands during the summer months. The fact that in 1912 nearly a month was spent at this, then primitive, hacienda at the very same time of the year,

without meeting a single goldfinch is probably significant. At that time, the establishment was a cattle ranch, and the now cultivated fields were rolling, grassy prairie, dotted with low mimosa bushes.

Nesting.—This species is a midwinter breeder, nesting in the oak-pine association of the cordillera in November and December.

Plumage notes.—The annual and postjuvenile molts take place in the late spring and early summer. This is a complete reversal of season as compared with the northern races. Its cause may be the reversal of breeding activity, but there is so much evidence from analogy that the functions of breeding and molting are not necessarily interrelated, that one hesitates to believe it. At any rate, the fact remains that all twelve specimens (adults and young alike) taken at Zapotitán June 21, 22, and 23, are just finishing a complete (the annual) molt which has renewed not only the body plumage, but the entire series of remiges and rectrices. The abraded condition of the November and December breeding specimens precludes the possibility of any fall molt, at least as concerns the flight feathers. If there is a fall (in this case prenuptial) molt of portions of the body plumage, there is no evidence of it in the breeding birds collected.

Five adult males with hard, fully granulated skulls and two males of the year with soft, almost wholly ungranulated skulls were taken at Zapotitán. These two groups are absolutely indistinguishable, except that one of the young males still retains three juvenile secondaries in each wing, and there are very faint traces of greenish edgings on a few feathers of the back and rump. In other words, what is to all intents the full black and yellow plumage of the males is attained with the first (postjuvenile) molt. This naturally leads one to infer that the slight amount of black sometimes present in the dorsal plumage of *Spinus psaltria hesperophilus* is not necessarily dependent on age.

Colors of soft parts.—Adult males: iris, dark brown; maxilla, olive with tip, dusky; mandible, yellowish olive; tarsi and feet, dark brown. Females and immatures not recorded.

Stomach contents.—Small, white-shelled seeds, 1; mistletoe berries, 4; sunflower and thistle seeds, 12.

HYPOTHETICAL LIST

Included in the following list are species or subspecies in good standing whose ascription to El Salvador appears unjustified. Names

based on faulty determinations or restricted because of subsequent revisionary work, are not included since these are dealt with in their proper places in the body of the work.

***Sula leucogastra* (Boddaert).**

Sula fiber Sclater and Salvin (not *Pelecanus fiber* Linnaeus), *Ibis*, p. 233, 1859—"Off the coast of San Salvador."

Sula leucogastra Salvin and Godman, *Biol. Centr.-Am., Aves*, 3, May, 1901, —p. 149 "Off the coast of Salvador."

Salvin and Godman express doubts as to the identity of the bird which flew aboard the steamer on which Salvin was a passenger, in late June, or early July, 1858. It was not preserved, so the question cannot now be settled. G. C. Taylor in the *Ibis* for 1859, page 151, records under the name *Sula fusca*, a species of booby nesting on "Bird [Pájaro] Island" in Fonseca Bay. Since the locality is just within Honduran territory, there is no doubt that some species of booby occurs at times in El Salvador waters, but its identity is not, as yet, established.

***Celeus castaneus* (Wagler).**

Celeus castaneus Ridgway, *Bull. U. S. Nat. Mus.*, 50, pt. 6, p. 141, 1914—La Libertad, Salvador.

Reference to the *Biologia Centrali-Americana* (*Aves*, 2, p. 441, 1895), the authority cited by Ridgway as the basis for the above record, fails to show any citations for El Salvador. However, La Libertad in *Nicaragua* is given in that work, and it seems likely that the two towns were confused.

***Malacoptila panamensis inornata* (Du Bus).**

Malacoptila panamensis inornata Ridgway, *Bull. U. S. Nat. Mus.*, 50, pt. 6, p. 390, 1914—Salvador; Peters, *Bull. Mus. Comp. Zool.*, 71, p. 318, February, 1931—Salvador.

Although Ridgway gives El Salvador in the range ascribed to this form, a search of the bibliography fails to disclose any basis for the inclusion. Dr. C. W. Richmond informs us that a search of Ridgway's own records and of the specimens in the collection of the U. S. National Museum has likewise failed to provide a clue. Peters, as he informs us, simply borrowed the citation from Ridgway.

***Cyanerpes lucidus lucidus* (Sclater and Salvin).**

Cyanerpes lucidus Bangs, *Auk*, 24, p. 308, 1907—Salvador.

Bangs informs us that he included El Salvador in the range of this form "on geographic grounds." There are no actual records.

EXPLANATION OF PLATES

- I. El Salvador bobwhites (*Colinus leucopogon leucopogon*, male and female on rocks; *Colinus leucopogon hypoleucus*, male and female left and right; *Colinus leucopogon intergrade*). From a painting by Allan Brooks.
- II. Relief map of El Salvador to illustrate the more important topographic features.
- III. View from Mt. Cacaguatique looking south across the lowlands to Volcán de San Miguel (left) and Volcán de Usulután (distant right). The effects of denudation are plainly seen in the foothills of the middle distance. The woods in the foreground mark the upper limit of Arid Lower Tropical Zone forest. Photo taken from 3,500 feet altitude December 20, 1925.
- IV. Looking northwest from the Colinas de Jucuarán across Lake Olomega to Volcán de San Miguel (left). This view is typical of the relatively primitive woodlands in the southeastern part of El Salvador. Photo taken in September, 1925.
- V. Tidal estuary at Barra de Santiago. The growth is chiefly mangrove, an association which plays a limited though important part in the distribution of tropical bird life. Photo taken March 31, 1927.
- VI. Beach scrub at Barra de Santiago. The growth here is chiefly *Acacia* and *Mimosa*. Taken March 31, 1927.
- VII. Pines and grassland near the summit of Volcán de Conchagua. This association is characteristic of extensive areas in the Arid Upper Tropical Zone. Photo taken in March, 1926; altitude 3,600 feet.
- VIII. Pine-oak association in the Arid Upper Tropical Zone on Mt. Cacaguatique. The growth in this view, taken at 3,500 feet, is for the most part second-growth scrub. Taken December 20, 1925.
- IX. Humid Upper Tropical Zone vegetation on Los Esesmilés. The clouds which, throughout the year, drive through this zone from north to south (left to right in the picture) provide moisture for dense, tropical forest. This photo was taken March 1, 1927, a time when the arid zones are practically without rain or clouds. Taken at 8,500 feet.
- X. A cloud forest outpost. The dense parasitic growth is characteristic of the Humid Upper Tropical Zone of the north slopes and summits of the higher mountains. Zonal demarcation is often extremely abrupt. The opposite (southward facing) slope is Arid Upper Tropical, with pines, oaks, and brittle, thorny scrub. The valley in the right middle distance marks the course of the Sempul River, the boundary between El Salvador and Honduras. Photo taken March 1, 1927; altitude 8,500 feet.
- XI. Zonal demarcation on the south slope of Volcán de San Miguel. The foreground vegetation marks the extreme upper limit of Arid Lower Tropical Zone forest at this point. The upper levels are Arid Upper Tropical Zone grasslands dotted with oaks, waxberry (*Myrica*), and agave. Photo taken at 2,700 feet altitude in March, 1926.

- XII. A typical tinamou habitat. Goldman's tinamou (*Crypturellus cinnamomeus goldmani*) were often found walking or dust-bathing along this trail through the woods at Barra de Santiago. Photo taken in March, 1927.
- XIII. Range of the king vulture (*Sarcoramphus papa*) in El Salvador. Practically all of the birds of this species which were encountered were found within the limits of this view. Note the abrupt cessation of the Arid Lower Tropical Zone forest at 2,000 feet altitude. Photo taken at 2,200 feet on the Colinas de Jucuarán in September, 1925.
- XIV. Brush lands in the deforested mining area in eastern El Salvador. This region is the center of the range of Lesson's bobwhite (*Colinus leucopogon leucopogon*). Photo taken at Divisadero; altitude 800 feet; December 25, 1925.
- XV. A coffee finca at 3,500 feet altitude on Mt. Caraguatique. Interior long-toed quail (*Dactylortyx thoracicus taylori*) and tree quail (*Dendrortyx leucophrys nicaraguae*) were found at this place, Finca San Felipe. Most of the trees in this view are planted for coffee shade and have replaced the former oak forest. Photo taken December 20, 1925.
- XVI. Swamp forest habitat of the limpkin (*Aramus pictus dolosus*) and wood rail (*Aramides albiventris vanrossemi*) both of which were taken along this jungle stream just back of tidewater. Photo taken at Barra de Santiago in April, 1927.
- XVII. Nest tree of the yellow-naped parrot (*Amazona auropalliata*) at Puerto del Triunfo. This view is typical of the savanna and gallery forest association frequently encountered in the lowlands. Taken in January, 1926.
- XVIII. Huiscoyol undergrowth at Rio San Miguel, a typical habitat of parakeets, (*Nyctidromus albigollis intercedens*), Lesson's tinamou (*Crypturellus cinnamomeus cinnamomeus*), and Wetmore's ant tanagers (*Habia Salvini Wetmorei*). During the rainy season the leaf-covered open spaces become impassable hogs. Photo taken in February, 1926.
- XIX. The country of the quetzál (*Pharomachrus mocinno mocinno*). A portion of the cloud forest on Los Esesmiles, which includes a two-year-old clearing in the foreground, a ten-year-old stand of 40-foot second growth in the right center, and a portion of untouched forest with trees 100 feet tall to the left. Many characteristic cloud forest species such as the black chachalaca (*Penelopina nigra dielszei*), Guatemala barred owl (*Strix fulvescens*), Lafresnaye's blue-throated motmot (*Aspatha gularis*), and several hummingbirds were collected within the limits of this view. Photo taken at 8,500 feet on March 1, 1927.
- XX. Nest of northern tody flycatcher (*Todirostrum cinereum finitimum*). This type of construction makes a practically rainproof nest. Nests of Sclater's oriole (*Veterus sclateri sclateri*) [middle] and Lichtenstein's oriole (*Icterus gularis gularis*) [right]. The two types of construction and the materials employed are characteristic.
- XXI. Juncture of mangrove and swamp forest associations at Barra de Santiago; home of the ochraceous vireo (*Vireo pallens ochraceus*), mangrove warbler (*Dendroica erithachorides xantholera*), and wood rail (*Aramides albiventris vanrossemi*).

- XXII. Cloud forest undergrowth on Volcán de Santa Ana, the home of the orange-bellied redstart (*Myioborus miniatus hellmayri*), Dwight's flycatcher (*Empidonax flavescens dwightii*), rufous-browed wren (*Troglodytes rufociliatus nannoides*), and Salvin's nightingale-thrush (*Catharus frantzii alticola*). Taken at 5,500 feet in May, 1927.
- XXIII. Coffee growth and planted shade trees at 3,500 feet on Mt. Cacagua-tique. Typical habitat of Prevost's sparrow (*Melospiza biarcuatum*), Chavez' jay (*Cissilopha melanocyanea chavezii*), and interior long-toed quail (*Dactylortyx thoracicus taylori*). Photo taken in December, 1925.
- XXIV. Riparian growth at Rio San Miguel, a typical habitat of Richardson's seed-eater (*Sporophila minuta parva*), and of many other species such as the southern green heron (*Butorides virescens maculatus*), Texas kingfisher (*Chloroceryle americana septentrionalis*), jacana (*Jacana spinosa spinosa*), and Mexican black hawk (*Buteogallus anthracinus anthracinus*).

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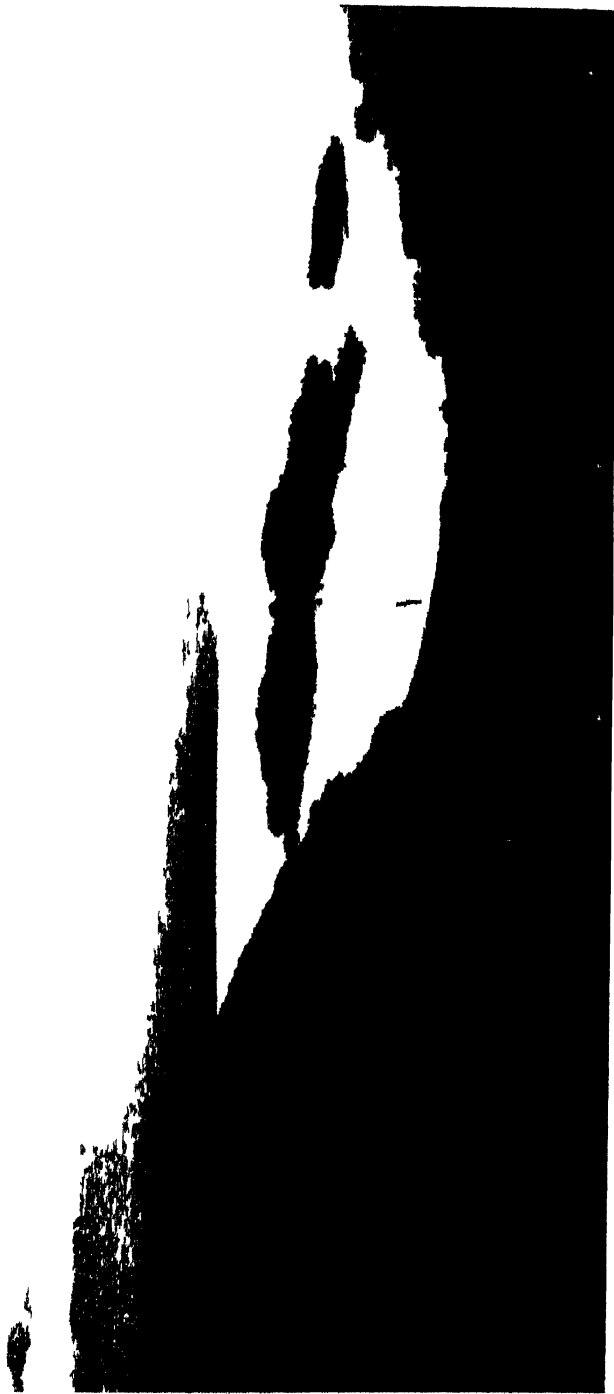
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RELIEF OF EL SALVADOR



LOOKING SOUTH FROM MOUNT CACAGUATIQUE



LOOKING NORTHWEST FROM THE COLINAS DE JUCLARAN



TIDAL ESTUARY AT BARRA DE SANTIAGO



BEACH SCRUB AT BARRA DE SANTIAGO



PINES AND GRASSLAND NEAR THE SUMMIT OF VOLCAN DE CONCHAGUA



PINE-OAK ASSOCIATION ON MOUNT CACAGUATIQUE



HUMID UPPER TROPICAL ZONE VEGETATION ON LOS ESESMILES



A CLOUD FOREST OUTPOST



ZONAL DEMARCATION ON VOLCAN DE SAN MIGUEL



A TYPICAL TINAMOU HABITAT



RANGE OF THE KING VULTURE IN EL SALVADOR



BRUSH LANDS IN THE DEFORESTED MINING AREA IN EASTERN EL SALVADOR



A COFFEE FINCA ON MOUNT CACAGUATIQUE



SWAMP FOREST HABITAT OF THE LIMPKIN AND WOODRAIL



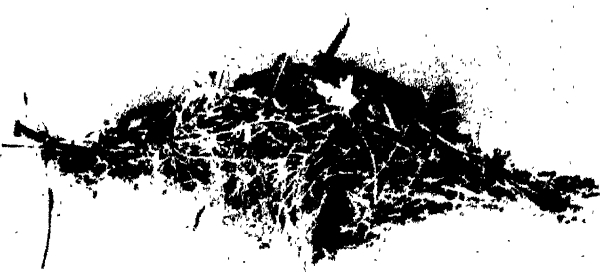
NEST TREE OF THE YELLOW-NAVED PARROT AT PUERTO DEL TRIL NFO



HUISCOYOL UNDERGROWTH AT RIO SAN MIGUEL



THE COUNTRY OF THE QUETZAL



NESTS OF NORTHERN TODDY FLYCATCHER, SCLATER'S ORIOLE,
AND LICHTENSTEIN'S ORIOLE



JUNCTION OF MANGROVE AND SWAMP FOREST ASSOCIATIONS AT BARRA DE SANTIAGO



CLOUD FOREST UNDERGROWTH ON VOLCÁN DE SANTA ANA



COFFEE GROWTH AND PLANTED SHADE TREES ON MT. CACAGUATIQUE



RIPARIAN GROWTH AT RIO SAN MIGUEL

